A CLINICAL STUDY OF POSTERIOR CHAMBER INTRA-OCULAR LENS IMPLANTATION

THESIS

For

MASTER OF SURGERY

(OPHTHALMOLOGY)

Approved

15/2/92

BUNDELKHAND UNIVERSITY

JHANSI (U. P.)

1991

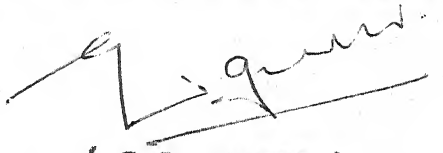
GYANENDRA SINGH

C E R T I F I C A T E

This is to certify that the work entitled 'A CLINICAL STUDY OF POSTERIOR CHAMBER INTRAOCULAR LENS IMPLANTATION' which is being submitted as thesis of M.S. (Ophthalmology) has been carried out by Dr. G. Singh in the Department of Ophthalmology under our direct supervision and guidance.

The techniques and methods described were performed by the candidate himself and the observations have been periodically checked by us.

He has put in the necessary period of stay in the department according to University regulations.



(G.D. GUPTA)
MS, DOMS,
Associate Professor & Head,
Department of Ophthalmology,
M.L.B. Medical College,
Jhansi.

(CO-SUPERVISOR)

C E R T I F I C A T E

This is to certify that the work entitled 'A CLINICAL STUDY OF POSTERIOR CHAMBER INTRAOCULAR LENS IMPLANTATION' which is being submitted as thesis of M.S. (Ophthalmology) has been carried out by Dr. G. Singh in the Department of Ophthalmology under our direct supervision and guidance.

The techniques and methods described were performed by the candidate himself and the observations have been periodically checked by us.

(V.K. MISURYA)
M.S.
Assistant Professor,
Department of Ophthalmology,
M.L.B. Medical College,
Jhansi.

(CHIEF-SUPERVISOR)

ACKNOWLEDGEMENT

It is with profound sense of gratitude that I pay my obeisance, to my esteemed guide and teacher Dr. Vijay Kumar Misurya, M.S., Assistant Professor, Department of Ophthalmology, M.L.B. Medical College, Jhansi who with his unfathomed knowledge and experience, canny precision and untiring zest of work guided me unflinchingly throughout this humble venture. His inspiration fostered me greatly throughout the study and it may not be an exeggeration to say that he is instrumental in the successful completion of present work.

I wish to express sincere gratefulness to my revered teacher Dr. G.D. Gupta, M.S., D.O.M.S., Associate Professor and Head, Department of Ophthalmology, M.L.B. Medical College, Jhansi; for his excellent guidance and supervision throughout the entire work.

I am highly obliged and thankful to Dr. B.S. Jain, M.S., Assistant Professor, Department of Ophthalmology, M.L.B. Medical College, Jhansi who inspired me with his ready suggestions from time to time.

I am highly grateful to Dr. V.D. Mathur, M.S., Additional General Manager and Chief Medical Officer, Central Railway, Bombay for his generous support during this period of my study.

I am thankful to Mr. B.D. Mathur, M.Sc., D.H.S., Associate Professor (Statistics & Demography) Post Partem, M.L.B. Medical College, Jhansi for his valuable assistance during my study.

I deeply value the advice and generous help extended to me by my colleagues and friends throughout the study.

I am undoubtedly thankful to Mr. R.S. Vishwakarma, who has meticulously typed this volume of work.

Lastly I indebted my parents and wife for their persistant inspiration which enabled me to perform this work successfully, to whom I dedicate this work of mine.

(GYANENDRA SINGH)

C O N T E N T S

****

INTRODUCTION

INTRODUCTION

It is well established fact that the replacement of natural cataractous lens with an artificial one is one of the best ways to rehabilitate the cataract patient. It should be pointed out briefly; why ophthalmologists did not continue to perform the simple cataract operation which in this century became one of the safest procedure in medicine. The answer is self evident - aphakia has many disadvantages.

The aphakic glasses are not ideal optical aids. Although the patient might achieve the normal central vision; his visual field is markedly constricted which is compounded by ring scotoma. Further, difficulties develop through the spherical abberrations of the aphakic lenses. And above all from the prism effect that occurs when one looks through the side of the lens.

Further the cataract glasses magnify the image between 25 to 30%. It is therefore, impossible to correct a patient with monocular aphakia. Even with bilateral aphakia; the magnification effect is a handicap objects appear to be nearer than really they are. This leads to false visual orientation and difficulty with coordination. The patients with aphakic glasses are unable to estimate the distance properly and that even crossing of a road becomes dangerous.

A significant improvement for the cataract patient came with introduction of the contact lens because its magnification effect is considerable smaller only about 8% and problems of spherical aberration, distortion and ring scotoma are eliminated.

The contact lenses can be fitted in monocular aphakia. However, contact lens can lead to corneal vascularisation or endothelial decompensation. If lens hygiene is neglected, it may lead to corneal ulcers even loss of the eye. Contact lens are not useful for patient, who are working in dusty environment. Old patient with diminished lacrimation have trouble in wearing them. Further, many contact lens frequently get lost.

Keratophakia and epikeratophakia is still limited to investigative condition and to a few centres. The usual recovery time is longer and final visual result is same time less satisfactory than that obtained with other modalities of rehabilitation.

All the just mentioned difficulties are minimised if an artificial intraocular lens is implanted. This statement is based on well documented, clinical evidence gathered by many ophthalmologist through out the world.

There are many type of IOL implant lens, anterior chamber IOL, iris supported IOL implants and posterior chamber IOL implants. The best one is as good as naturally occuring lens is post chamber intraocular lens with better centering and fixation.

The other advantages of posterior chamber IOL implants over anterior chamber lens and iris supported lens are reduced incidence of corneal complications, iridocyclitis, cystoid macular oedema, iris atrophy, secondary glaucoma, UGH syndrome, implant dislocation and retinal detachment.

These are very useful for patients whom aphakic spectacles are unpractical or even dangerous to wear (Monocular Aphakic patients, Pilots, Surgeons, Drivers and active outdoor people who require good Peripheral vision such as, sportmen and hunters).

These are also useful in farmers, ranchers, road workers, labour of fumy chemical contaminated environment, whom contact lens are contra-indicated.

With these posterior chamber implants patient can be discharged after few hour to one day and can perform his routine work within a week time, hence early rehabilitation is great advantage, with good visual acuity and good binocular vision alongwith better field of vision and no enlargement of image.

There are few disdavantages also like it can be put mostly after extracapsular cataract extraction, late thickening of posterior lens capsule which need a posterior capsulotomy is a difficult procedure if polishing of post capsule was not done properly during implantation and there are chances of dislocation also.

The various posterior chamber implants are pearce rigid tripod lens, Shearing 'J' loop lens, Simcoe 'C' loop lens, Sinsky, Kratz, Kelman modified 'J' loop and Mazzocco silicon (elastic) lens. These lenses are made up of rigid or flexible loop, made up of polypropylene or PMMA and are sterilized by ethylene oxide gas.

.....

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Tadini an intinerate ophthalmologist of the 18th century was probably the first person to mention the possibility of lens implantation into the eye in place of the natural cataractous lens.

Later on, in 1795 Casamata implanted an artificial lens of glass after cataract extraction.

GENERATION - I :

Harold Ridley of London observed that the fragment of plexiglass (PMMA, Perspex) from shattered cockpit canopies could be well tolerated with in the eyes of British Pilots following ocular perforation. The first intraocular lens (IOL) was implanted into the capsular bag following extra-capsular cataract extraction at St. Thomas Hospital of London on November, 29, 1949 and the second on August, 23, 1950. These two lenses had too high a refractive power; therefore, the patient postoperatively had a -20.0 and -15.0 D myopia respectively. These results compelled Ridley to calculate the radius of curvature. The new lenses were implanted by him in 750 eyes, around 1959 he gave up implantation because there were too many complications.

Ridley summarized the complication of his IOL as follows :

(1) Iritis due to residual lens material in the eye or inadequate removal of implant sterilizing solution.

(2) Occlusion of the pupil by lens inflammatory membrane.

(3) Late thickening and opacification of posterior capsule especially in young patient.

(4) Loss of anterior chamber.

(5) Secondary glaucoma.

(6) Iris atrophy from pressure by optic of IOL.

(7) IOL Dislocation.

GENERATION - II :

Ridley lens was soon followed by several other type of lenses that shared the feature that their rigid or elastic support was fixed with angle of anterior chamber. These are described as 2nd Generation lenses. The main advantage of them are -

(1) Implantation could be done after intra or extra capsular cataract extraction.

(2) Secondary implantation could be performed.

(3) Chances of dislocation of lens are minimal.

Baron (1952) performed the first anterior chamber lens implantation. This IOL was a curved disc with a bent forward curve toward the cornea and it comes into contact with the corneal endothelium leading to corneal decomposition.

In 1952 Danheim designed the first flexible closed loop type of anterior chamber lens. This lens failed because of the nylon haptics (Supramid-6) which undergoes hydrolytic biodegradation in the eye. This biodegradation led to irritation in the eye, breakdown of loops and disintegration of the IOL with dislocation.

Strampelli on 28th September, 1953 implanted a tripod anterior chamber lens which was a prototype of rigid anterior chamber IOLs. He had reported to the International Ophthalmological Congress in Brussels that two - third of his eyes on which he operated in 1953 developed bullous keratopathy after 5 years of quietness (1958).

In 1956, first Choyce rigid anterior chamber lens was introduced and later its modifications culminated in the product of near VIII and IX IOL. UGH syndrome of Ellingson was initially attributed due to warped foot plate and poor edge finish of same poorly made copies of these lenses.

Baraquer (1959) modified the Danheim lens and his closed loop anterior chamber lens in 'J' loop IOL for the first time after cutting away the one half of each of the closed loop. There lenses gave good results but the nylon loop biodegradation and erosions into angle recess were the main complication. The 'J' loop and its various modification have been incorporated with great success into modern PC IOL.

Pseudophakos of these kinds were implanted by among other - Beitti (1955), Boberg-Ans (1961), Leib & Guerry (1958), Ridley (1952), Scharf (1953) and Schreik (1954).

GENERATION + III :

Centered development of anterior chamber lens and introduction of iris supported lens. In 1953 Epstein introduced iris supported lenses of collar studtype with iris fixation.

Binkhorst in 1957 developed the original iris clip lens which was implanted for the first time on 11th August, 1958. Binkhorst based his design on following consideration -

(1) PMMA is well tolerated in the eye provided it has been properly cleaned and sterilized.

(2) Posterior chamber lenses, upto that time, had a strong tendancy to dislocate.

(3) Most of the anterior chamber lenses in use at that time had a high incidence of corneal complications.

(4) The results with the original Ridley posterior chamber lens indicated that contact of the implant with posterior surface of iris did not, in itself, give rise to any complications. He believed that iris atrophy and its consequances were caused by uveitis and not by contact.

In 1965 Binkhorst modified the original lens into two loop iridocapsular lens.

Later metal loops were introduced in Epstain maltesecross lens which evolved into Copeland lens.

Fyodorov in 1968 introduced sputnik iris clip lens in Soviet Union.

In 1972 Worst medallion iridocapsular and in 1973 Worst platina lens were introduced.

The following complications were encountered in long term with these IOL.

1. Atrophy Erosion of ocular tissues.
2. Corneal decompensation, oedema and pseudophakic bullous keratopathy.
3. Cystoid macular oedema.
4. Inflammation and U.G.H. syndrome.
5. Cellular proliferative reaction leading to posterior capsular membrane; pupillary membrane; secondary glaucoma, cocoon, membrane excessive fibrosis and synechiae, vitreous face opacities.
6. Subluxation or dislocation.
7. Complication related to biomaterials eg. nylon and metal loop.

GENERATION - IV :

Major improvement in micro-surgical techniques, lens materials and lens design; introduction of posterior chamber lenses.

From 1975 to the present there has been the increasing use of ECCE and posterior chamber implantation. Numerous modern, well designed anterior and posterior chamber IOL have been introduced which are listed in Table - I. Now the implantation techniques are more refined and safer. This era has also seen the transition from nylon to polyethylene and PMMA as a loop material.

The most important beakthrough was a return to Ridley's original idea of posterior chamber IOL.

The first of the modern generation posterior chamber lens was pearce rigid tripod lens introduced in England in 1975.

In 1977 Shearing introduced 'J' loop IOLs and placed into posterior chamber by anchorring it at the cilliary sulcus or within the lens capsular bag. The use of various lens insertion glides and viscoelastic surgical adjuncts have made in the bag implantation as easier procedure.

Other iridocapsular lenses are - Simcoe 'C' loop lens, Kratz and Sinsky lens (mid 70 to late 1980's). Jacobilindstorm lens, Faulkner lens, Rainin cotrolflex lens,'J' loop, Lynell lens, Pannu lens, Shepard universal lens 3 M / 34 S lens and Mazzocco Silicon lens.

Many surgeons feel uneasy at placing a foreign body into the biologicaly active highly vascular and nerve containing tissue, such as the uvea. The removal of lenses from the ciliary body is extremly difficult. This further develop the placement of lens inside the capsular bag (endocapsular) after ECCE.

1978, 79, 82 Binkhorst realizes that the anterior loop of his 4 loop lens were unnecessary when he placed the posterior loop into the bag after ECCE, since the lens in most instances was adequately fixed. He changed the design accordingly and called it the Binkhorst endocapsular lens.

1980, 83 Anis presented the original and physiologic concept of lens design. He felt that the supportive element of IOL should be circular and fill almost the entire equatorial circumfrances of capsular bag. Advantages of which are -

1. Decentralisation of lens will not occur.
2. Subluxation is less likely.

3. Posterior capsule is evenly stretched in all direction preventing formation of folds in the capsule that might hamper the visual function.

4. No rotation is necessary.

Slight modification was done in Caland lens; and sheet lens.

In 1983 Binkhorst introduced an "all retropupillary lens (Moustache lens) having ultrathin optical part of PMMA of 6 mm diameter and 'J' loop haptic made up of 0.16 mm extremely soft polypropylene attached to the utmost periphery of lens. Overall length is 12 mm. The two haptic loops are oriented in mirror image in such a way that a straghtforward" "One movement insertion" is possible.

In early, 1980 'J' loop lens for in-the-bag placement developed while original 'J' loop were designed to be placed in iridoceliary sulcus. The diameter of iridociliary sulcus fixated lens were 13.5 to 14 mm, while slightly reduced about 12.5 mm for endocapsular fixation in bag.

The 'C' loop lens of Simcoe is also available in a diameter suitable for in-the-bag placement.

In 1983 Mazzocco (Staar) described a one piece silicone lens that is 6 mm in diameter but can be folded for insertion through a 3 mm corneoscleral wound. It is autoclavable and foldable and having excellent optical qualities and seem to be very gentle to the tissues.

Mitsuru Nakazawa MD and Kyoshi Ohtsuki MD (1983) in Japan measured apparant accommodation in 42 pseudophakic eyes (34 patients after implantation of posterior chamber IOL lenses. The mean apparant accommodation was 2.03 ± 1.03 diopters. The mean accommodation power of 16 phakic eyes used as controls was 2.91 ± 1.29 diopters. The diameter of the pupil appeared to be most important factor in apparant accommodation - the smaller the pupil, the greater the apparant accommodation apparant accommodation was universely proportional to the diameter of pupil. There was no correlation however, between apparant accommodation and corrected visual acuity, refractive error, corneal astigmatism, or axial length. There was a negative correlation between apparant accommodation and anterior chamber depth.

Thomas, J, Liesegang MD, Willam M, Bourne MD, and Duane M Ilstrup MS. (1984) carried out a study at Japan showing short term and long term endothelial cell loss associated with cataract extraction and intraocular lens implantation.

A group of 249 patients undergoing cataract extraction with intraocular lens implantation underwent specular microscope endothelial cell photographs before surgery and eight week, and two year after surgery. The intraocular lenses used were shearing posterior chamber lens and transiridectomy clip

lens after extracapsular cataract extraction and the medallion iris suture lens after intracapsular cataract extraction. Thirty seven patient, who underwent cataract extraction without implantation served as controls. Eight week after surgery, there was no statical difference between the groups with intraocular lenses and the groups without them. One year and two year after surgery, endothelial cell loss had occured in all groups except the group who underwent extracapsular cataract extraction without intraocular lens implantation a group in which the patients were younger.

The long term endothelial cell loss was greater after intracapsular cataract extraction and was greater in presence of an implant. There was stastically more endothelial lens with the transiridectomy clip lens than with posterior chamber lens eight week and one year after surgery; the patient with posterior chamber lenses had continued to have more endothelial cell loss during the second postoperative year.

Coleiro JA (1986) studied combined intraoapsular extraction and trabeculectomy with severin five loop posterior chamber intraocular lens. The efficacy and safety of combined operation for cataract and glaucoma is established. The result of treating 24 eyes in series of control of glaucoma are discussed.

There was a early pressure rise above 24 mm Hg in six eyes (25%) but this settled with in a week or month. This may have been steroid related.

The intraocular pressure was assessed at six and at 12 month (mean 15.7 months) and the procedure determined as successful of the reading was 20 mm Hg or less. 12 eyes (50%) were controlled off all the treatment, with 5 eyes (20.8%) on pilocarpine. Three eyes (12.5%) required pilocarpine and timolol with another three eyes controlled on timolol only. The glaucoma was uncontrolled in one eye (4.1%) which still required multiple preparation.

Visual results - Eighteen eyes (75%) achieved a corrected acuity of 6/12 or better. Four eyes (16.6%) had significant recovery of useful vision in range of 6/18 to 6/60 due to various grades of senile macular degeneration.

The degree of astigmatism was less than 2 diopter in all cases.

David M, Meisler MD et al (1986) studied six cases of chronic propionibacterium endophthalmitis after extra-capsular cataract extraction and posterior chamber intra-ocular lens implantation. The inflammation was characterized by the clinical appearance of a granulomatus iridocyclitis. Cultures of intraocular specimen obtained from six eyes yielded propionibacterium; five yielded p. acnes. Post-

operative propionibactorium endophthalmitis may masquerade as a chronic iridocyclitis.

Richard bates (1986) developed a new forcep to simplify capsular bag fixation during posterior chamber lens implantation. This instrument has been designed especially to met the needs of superior loop placement of Sinsky-Kratz posterior chamber IOL with minimal intraocular manipulation and it facilitate capsular bag fixation.

John G, Sebestyen MD (1986) studied the relationship between IOL and diabetes mallitus. The reviewed 74 censecutive unselected diabetic patient (91 eyes) who had cataract extraction with intraocular lens implantation. The retinopathy status remain unchanged in 79 eyes. Of the 12 in which retinopathy status changed, four eyes without previous retinopathy, seven eyes that had mild background retinopathy progressed to moderate background retinopathy, and one eye that had background retinopathy developed mild proliferative retinopathy. Sixtyfour eyes (70.3%) achieved visual acuities of 20/40 or better.

Steven T, Simmons MD, David Litooff BA, and George L, Spaeth MD (1987) reviewed 75 consecutive cases of extracapsular cataract extraction and posterior chamber lens implantation combined with trabeculectomy in 69 patients with glaucoma. The mean preoperative intraocular pressure was

19.3 mm Hg on an average of 2.3 glaucoma medication. Visual acuity improved in 58 eyes (65%) achieved a visual acuity of 20/40 or better; three patients had further deterioration of vision at the completion of followup because of progressive glaucoma or macular disease. Post-operatively, the average intraocular pressure was 3.8 and 3 mm Hg lower than the pre-operative level at two and 12 month ($P < .001$) on 0.63 and 0.79 glaucoma medication respectively. However, 27 (36%) of the 75 eyes had a recorded intraocular pressure greater than 30 mm Hg or more above their preoperative level during the first six month after surgery. Despite improved long term control of intraocular pressure, detectable conjunctival filtering blebs were present in only (41%) of 75 eyes at two months & in seven (12%) of 56 eyes at 12 months. Hyphaema occured in 34 (45%) of cases.

Neumann R, Zalish M, and Oliver M (1988) studied the effect of intraocular lens implantation on combined extraocular cataract extraction with trabeculectomy. Author compared 23 eyes subjected to ECCE and trabeculectomy with additional posterior chamber IOL implantation. The result showed that IOL implantation did not have a detrimental effect on postoperative IOP reduction, gain in visual acuity; or need for antiglaucoma medication. The incidence of anterior chamber reactions consisting of development of posterior synechiae and fibrin formation was significantly higher with

IOL had been implanted. However, the fibrosis was generally absorbed within 14 days and posterior synechiae did not occlude the visual axis. He concluded that IOL implantation should be included in these combined operation with the object to rehabilitating visual function.

Michael S, Wsler MD, Craig J, Helm BS, and Herbert Kaufman MD (1988) observed visual results after keratoplasty in patients with posterior chamber intraocular lenses. Authors performed penetrating keratoplasty in 20 consecutive patients who had posterior chamber intraocular lenses and who developed pseudophakic bullous keratopathy.

All patients received 8.0 mm grafts placed in 7.5 mm recipient beds. None of the intraocular lenses were removed. Final visual acuity was 20/40 or better in eight (40%) and 20/80 or better in 15 (75%) of the patient. Senile macular degeneration (one case), corneal graft rejection (two cases), and wound infection (one case) contributed to poor visual results in the remaining patients.

Khalid J, Awan MD (1988) performed uncomplicated posterior chamber intraocular lens implantation into two eyes that had been salvaged after expulsive choroidal haemorrhage during a previous cataract operation and in one eye after loss of fellow eye from expulsive choroidal haemorrhage. The procedure was performed in a 72 year old man four months after

the successful management of expulsive choroidal haemorrhage. A third patient, are 84 year old woman and posterior chamber intraocular lens implantation in her remaining eye six year after the loss of other eye. All patients had a final visual acuity of 20/40 or better after a followup period of six months to four years.

J Wollensak, B Zeisberg and T Pham Duy, Klim Monotsble (1988) in his series of 6,000 patients who has undergone extracapsular cataract extraction and Simcoe type posterior chamber implantation noted the incidence of retinal detachment of 0.33%.

Maninder Singh Dang and PP Sunder Raj (1989) studied 400 eyes which underwent cataract extraction with posterior chamber lens implantation to compare the predictive accuracy of various IOL power calculation formulae. The new Sanders Retzlaff-Kraff (SRK) II formular was more accurate than original SRK and Binkhorst II formulae. Modification of a constant used in the SRK II formula to make it 'surgeon specific' improved its performance further, 80% of the eyes less than 1 dioptre error and only one eye (0.3%) had an error of more than 3 dioptres.

H Kaz-Soong MD, David C, Musch Ph D; Vera Kowal; Alan Sugar MD; Roger F, Meyer MD in 1989 retrospectively studied the clinical records and the corneal endothelial counts

of 133 consecutive eyes that received sutured posterior chamber intraocular lenses during penetrating keratoplasty in the absence of lens capsular support. Postoperative followup time ranged from three to 24 months, with 82 patient having atleast one year followup at one year, 45.1% of these patients had 20/40 or better visual acuity, 30.5% had a visual acuity between 20/50 and 20/100; and 24.2 had a visual acuity of 20/200 or worse. At two year 63.6% had a visual acuity of 20/40 or better; 18.2% had between 20/50 and 20/100 and 18.2% had visual acuity of 20/200 or worse.

At 1 year the average endothelial cell loss in the graft averaged 19% with futured posterior chamber lenses.

William E, Swiddy MD (1989) introduced a new technique of management of dislocated posterior chamber intraocular lenses. Posterior chamber dislocation of an intraocular lens in the vitreous cavity is an uncommon but serious complication of the standard extracapsular surgical technique for cataract extraction with intraocular lens implantation is managed by using vitrectomy techniques and scleral fixation suture of the intraocular lens and allows permanent, controllable relocation of intraocular lens and avoid trauma to the iris and cornea that previous technique for intraocular lens repositioning may induce.

S Tony Fernandez; Sebastion Pious and Noel Moniz (1989) analysed first 500 cases of posterior chamber lens implantation inserted in capsular bag. Followup was done for 6 month to 2 year. Although posterior capsule rupture occured in 23 cases, the lens was inserted in 12 cases with a small tear. In general the complications were found to be more than 80% of cases. The only problem faced by authors were thickening of posterior lens capsule (11.6%) high astigmatism (12.2%) pupillary capture (5.6%) and decentering of the lens.

Sudhakar J, Ravindran RD, and Natchiar G (1989) analysed complication in 1,000 cases of primary posterior chamber lens implantation during period of one year. The important postoperative complications were uveitis (9%), Striate keratitis (7.3%), endophthalmitis (0.5%) malposition of IOL (2.8%) and cystoid macular oedema (0.3%), posterior capsule opacification was seen in (11.5%) cases and was treated by YAG laser capsulotomy. More than 80% cases had 6/6 - 6/12 vision.

Keiki R, Mehtha (1989) studied 50 cases of foldable posterior chamber IOL implant after phacoemulcification cataract extraction through a 3 mm opening. Lenses used were starr, silicone lens, hydrophilic HEMA disc lens, Adatomed silicone lens. Visual results were 86% had 6/6 to

6/18; 24% had 6/24 to 6/60; corneal oedema 18%, hypopyon 4% cases, Hyphaema 4%, iris abrasion 16%, iritis 4% and secondary glaucoma in 4% cases.

Vilas bidaye 1989, observed that PMMA is not the best material for the manufacture of IOL. It can not be autoclaved and its contamination by ethylene oxide may cause post-operative sterile uveitis, Biodegradation as well as ultraviolet transmission can also damage PMMA. This lead to the search for other material for manufacturing IOLs and glass was found to be suitable. The main disadvantages of glass IOL is its inability to stand Nd-YAG laser posterior capsulotomy. YAG shatters this lens.

But posterior capsular opacification after ECCE is less common with 'in-the-bag' glass lens implant. If needed secondary posterior capsulotomy can be easily done using 30G disposable needle bent at its tip. It became lens of choice for diabetic patients as glass optic is resistant to Argon laser and successful argon laser caogulation of retina could be done through glass optic.

Piers Percival 1989 conducted a study 'Early experience with diffractive Bifocal lens'. Author observed the visual result of 33 bifocal lens implantation are compared with 33 matched PMMA monofocal implantation. Eighty two percent of bifocal and 15% of monofocal eyes could see

N8 (J5) or better with the distance correction (P/0.001). Fifty percent of +3.5D bifocal eyes could see N5 (J2) with the distance correction. The mean reading addition for seeing J2 at 25 cm was 0.7 D. The bifocal group and 2.2D in the monofocal group. Sixty percent of Bifocal group and 24% of the monofocal group felt that following surgery they could depend on the eye for most of the time without glasses.

C Huber 1989 developed surgical technique 'in-the-bag' implantation by air bubble pressure'. Author implanted 'C' or 'J' loop posterior chamber lens into the capsular bag by using the forces generated by an air bubble to introduce the intraocular lens into the capsular bag. The method is considered safe and easily taught because it uses mostly ab-externo manoeuvres.

Neilmanson, 1989 in England presented a new lens design for intracapsular cataract surgery. It is intended to achieve circumferential equatorial fixation. The accommodation of capsular bags of varying size and accurate centration. The lens manufactured as a single piece lathecut from a compression moulding of PMMA (ICI). Currently two forms are available - Planoconvex & Biconvex lens.

Advantages are - (a) less distortion of posterior capsule; (b) near 360°fixation of the loop without the need to fixate the optic with a large anterior capsular skirt; (c) centration of optic or the reduced risk of decentration allows foveal image with excellent acuity from the outset.

G Meur (1989) at Belgium introduced small incision disc lens. The preliminary result of in-the-bag implantation of a new intraocular lens whose mechanical feature are those of a large rigid disc, are presented. As it can be introduced through a 5 mm incision it is an interesting alternative to a soft intraocular lens in the field of phaco-emulsification.

In the priliminary series of 100 implantations, no instances of sunset syndrome or of anterior capture have been observed. To evaluate the lens position 6 week post-operatively 28 eyes were fully dilated. In 16 (57%) cases; the lens remain perfectly centred. In 12 (43%) cases, three is a slight decentration always less than 1 mm - 9 (32%), upward and 3 (11%) downward.

Fortynine patients were checked for CME by fluorescene angiography 6-7 week after surgery - three (6.1%) cases of CMO were observed. In 1 year followup posterior capsule thickening was not recorded as it is too early at that time to record this complication.

Nanako Furuse, Seiji Hayasaka, Yukari Yamamoto, Tomoichi Setogawa (1990) observed the corneal endothelial changes after posterior chamber intraocular implantation in patient with or without diabetes mallitus. Authors examined 96 patients (111 eyes) who underwent ECCE with the implantation of a posterior chamber IOL. The central cornea of all patient were photographed by specular microscope pre-operatively and 3, 6 and 12 months postoperatively. No significant differences in the endothelial cell density, coefficient of variation or cell loss were noted between these two groups.

I.A. Cunliffe, DW Flanagan, NDI George, RJ Aggarwaal, AT Moore in 1991 published their study extracapsular cataract surgery with posterior chamber lens implantation in diabetic with and without proliferative retinopathy. Author had examined all diabetic (66 operated eyes) and an equal number of non diabetic matched control who underwent ECCF with IOL implant over a period of 2 year. Of the diabetic patient 76% eyes improved by atleast 2 lines of snellen acuity post-operatively. They concluded that diabetic retinopathy is no contraindication for IOL implant.

Mamoru Matsuda et al in 1991 did the comparative study of the effect of intraocular irrigating solution on corneal endothelium in intraocular lens implantation. The glucose glutathione bicarbonate solution (BSS plus) was better than citrate acetate bicarbonate solution (S - MA2) with respect to effect on corneal endothelium.

Manoj R Mehta (1991) at all conducted a randomized clinical trial to compare intercapsular or endocapsular technique of IOL insertion and conventional posterior chamber IOL insertion after can opener capsulotomy. Age and sex matched groups of 76 patient each underwent surgery by two technique, the corneal and uveal reaction was evaluated on the first day after surgery and specular counts were done at 6 weeks. Though the difference between 2 groups was not statistically significant a trend in favour of intercapsular technique emerged strongly.

Now a day endocapsular posterior chamber IOL implants are being done which are having following advantages -

A. Intra-operative advantage :

1. Smaller predictable, more controlled capsulotomy.
2. The same capsulotomy technique can be utilized for all type of cataract.
3. Hydrodissection of the nucleus can be carried out safely under the capsular flap.

4. Endothelium is protacted during the nucleus delivery.
5. Endothelium is protected during aspiration of the cortical matter because of decreased turbulence.
6. Iris entanglement in the port and subsequent iris transillumination syndrome is reduced.
7. Smaller quality of visco-elastic substance are required to inflate the capsular bag.
8. 100% capsular fixation of the lower loop under direct vision.
9. IOL does not touch the iris or the endothelium during insertion.
10. A better centering of the implant can be achieved.
11. In case of rupture of the posterior capsule the anterior flap can provide support for a sulcus supported lens.
12. Useful technique when there are posterior synechiae.
13. Surgery can proceed after zonular dehiscence also the bag can be inflated again with visco-elastic material.

B. Post operative period :

1. Reduced corneal damage causes less oedema.
2. Reduced iridocyclitis.
3. Reduced incidence of cystoid macular oedema.
4. Sunset/Sunrise syndromes occurs infrequently.

Table - 1

EVOLUTION OF INTRAOCULAR LENSES

Generation - I : (1949-54) Original Ridley posterior chamber lens.

1. Ridley 1949.
2. Parry (Implantation modification, 1954).

Generation - II : (Ca 1952-62) Development of anterior chamber lens.

1. Rigid or Semirigid :
   - Baron 1952, 1954
   - Scharf 1953
   - Strampelli Tripod 1953
   - Schreck 1954
   - Beitti 1955
   - Choyce Mark I 1956
   - Ridley Mark I and II 1957, 1960
   - Boberg Ans 1961
2. Flexible or Semiflaxible loops :
   a. Closed loops
      - Dannheim 1952
      - Strampelli 1956
      - Leib and Guerry 1957

   b. Open loop
      - Baraquer 'J' loop 1959

Generation - III : (Ca 1953-1976) continued development of anterior chamber lenses and introduction of iris supported lenses.

1. Rigid or Semirigid -

   . Choyce Mark II 1957 to Choyce Mark VIII 1963.

2. Flexible -

   . Iris supported.

   . Epstein Collar stud lenses 1952

   . Binkhorst iris clip 1937, 1958

   . Epstein maltese cross (evolved into copeland -

   . Binkhorst lens) 1962

   . Fyodorov type I iris clip 1964

   . Binkhorst type I iris clip 1964

   . Binkhorst iridocapsular 1963

   . Fyodorov V-type II, sputnik iris clip. 1968

   . Worst medallion, iridocapsular early, 1970s.

   . Worst platina, early 1970s.

Generation - IV : (Ca 1975 to present) Major improvement in microsurgical techniques, lens design and materials, introduction of posterior chamber lens.

Anterior Chamber lenses :

1. Rigid or Semirigid -

   . Azar mark II 1977

   . Tennant Anchor 1979

2. Flexible or Semiflexible loops or foot plates-

A. Closed loop :

- Leiske 1978
- Hessburg 1981
- Optiflex 1982
- Stable Flex 1983

B. Open loops or Foot plates -

- Kelman II 3 point fixation, 1978
- Kelman quadriflex, 1981
- Kelman Ommifit, 1981
- Kelman Multiflex, 1982

C. Radial loops -

- Copeland, 1982.

Posterior chamber lens :

- Pearce rigid tripod, 1975
- Shearing 'J' loop mid to late 1970's early 1980's.
- Simcoe 'C' loop mid to late 1970's early 1980's.
- Sinsky modified 'J' loop mid to late 1970's early 1980's
- Kratz, modified 'J' loop mid to late 1970's, early 1980's.
- Clayman, modified 'J' loop mid to late 1970's early 1980's.
- Lindstorm, modified 'J' loop mid to late 1970's early 1980's.

- Harris, 1 open, 1 closed loop, modified 'J' loop.
- Closed modified 'J' loop both loops closed (eg. sheets, galand, knolle)
- Osher-Fenzl, modified 'J' loop with loop hole at tip of superior loop.
- Lewicky, modified 'J' loop with loop holes at lips of both loops.
- Rigid lens for YAG laser capsulotomy eg. Hoffer ridge.
- IOL with UVR absorbers in optics.
- IOL with biconvex or aspharical optics
- Lynell, glass optic
- Mazzocco silicine (elastic) IOL
- Universal types (designed to be placed in either anterior or posterior chamber (early, 1980's).
- Shepard universal (radial loops)
- Feaster Dualens
- Pannu type- III
- Meur Disc lens, 1989
- Bifocal lens, 1989

Generation - V :

Improvement in material and design of anterior and posterior chamber lenses and introduction of visco-elastic substances in ophthalmic surgery.

POSTERIOR CHAMBER LENSES

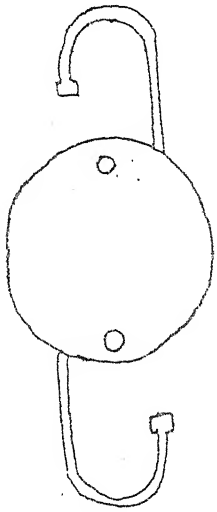
Single Plane lenses :

(A) Iridociliary sulcus fixated type of lenses: Flexible type:

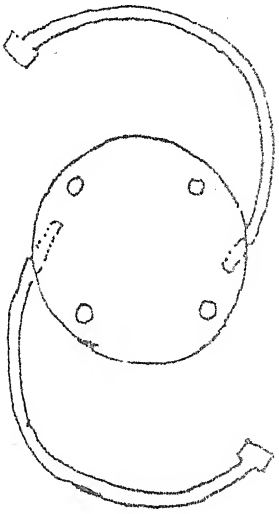
(i) Shearing J-loop lens

ii) Simcoe C-loop lens

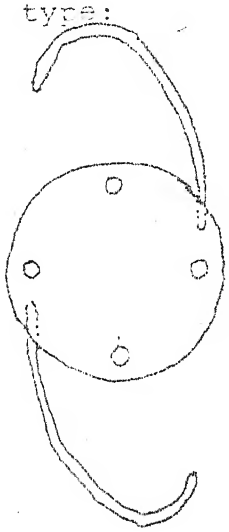
ii) Sinsky-Kratz J-loop lens



(i)



(ii)

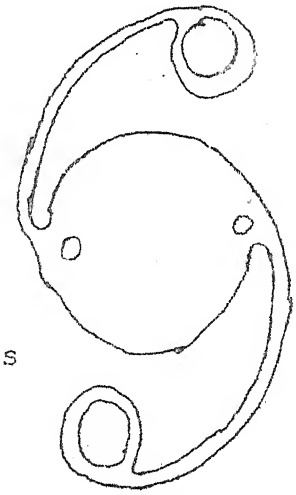


(iii)

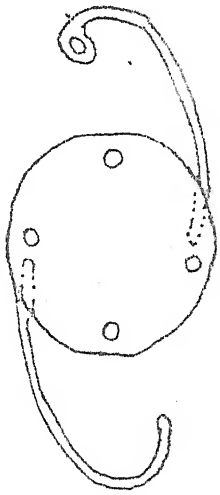
iv) Fannu lens

(v) Ebs-Fenzl-Osher lens

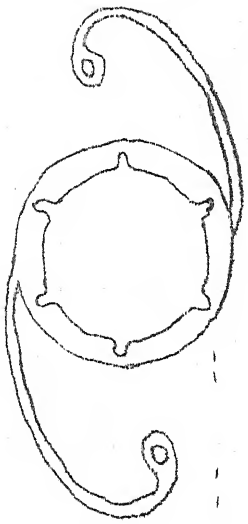
vi) Lynell J-loop lens



(iv)



(v)

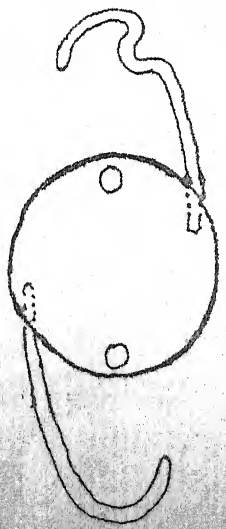


(vi)

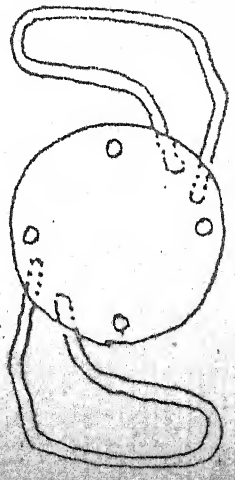
vii) Lester type J-loop lens

(i) 3M 34S lens

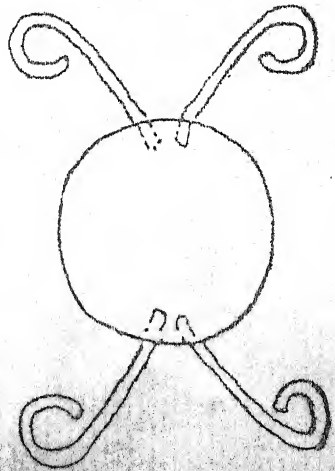
(ix) Shepard universal lens



(vii)



(viii)



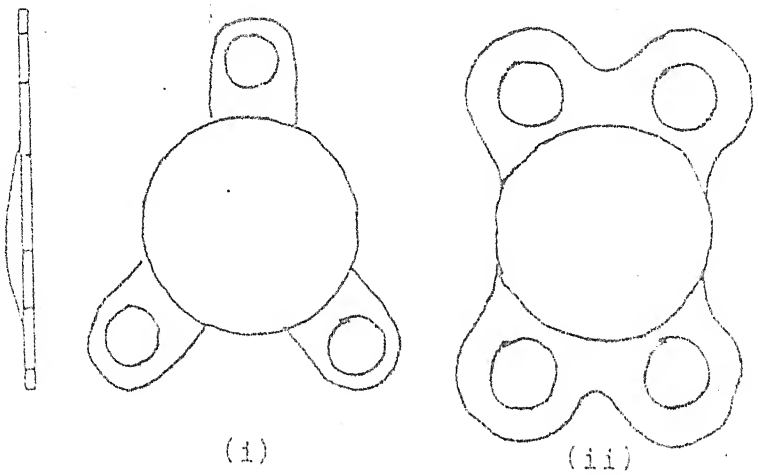
(ix)

Capsule fixated single plane Retropupillary lenses : Two types :

(a) Rigid type :

(i) Pearce lens

(ii) Harris Arnot lens



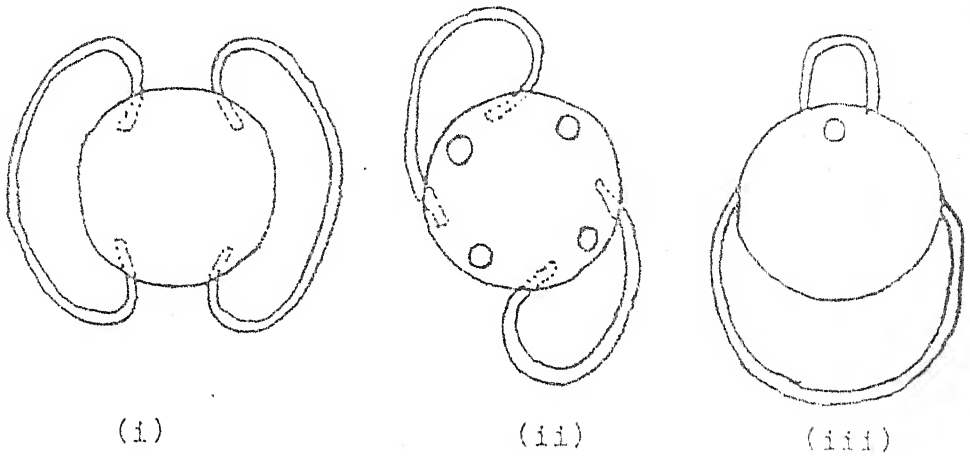
(i) (ii)

(b) Flexible type :

(i) Anis lens

(ii) Galand lens

(iii) Ong lens

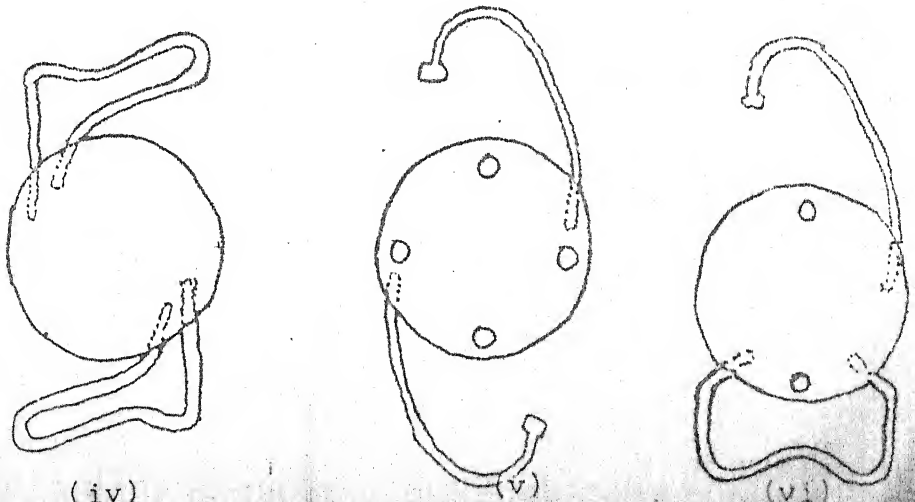


(i) (ii) (iii)

(iv) Sheets lens

(v) J-loop lens for capsular fixation

(vi) Harris II lens



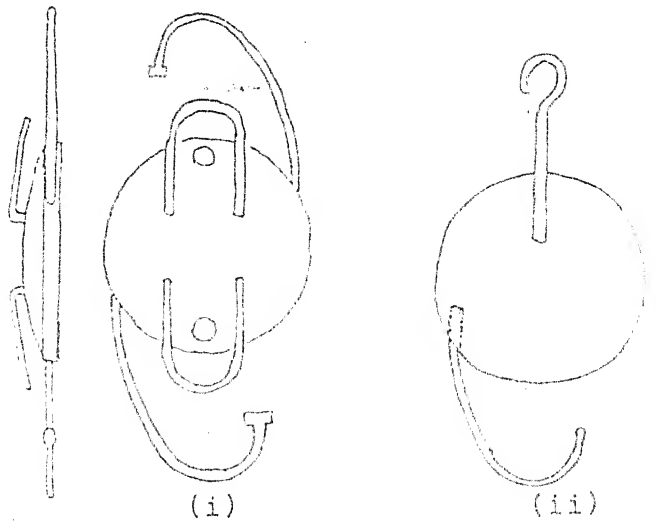
(iv) (v) (vi)

2. Two plane Retropupillary lenses : Two types :

(A) Iridociliary sulcus fixated type of lenses : Flexible type :

(i) Faulkner lens

(ii) Rainin lens

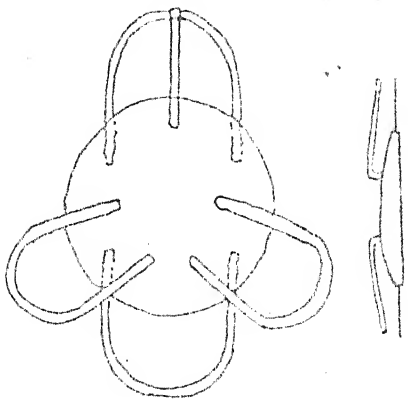


(i) (ii)

(B) Iris-clip fixated lenses : two types :

(a) Semirigid type :

(i) Severin lens

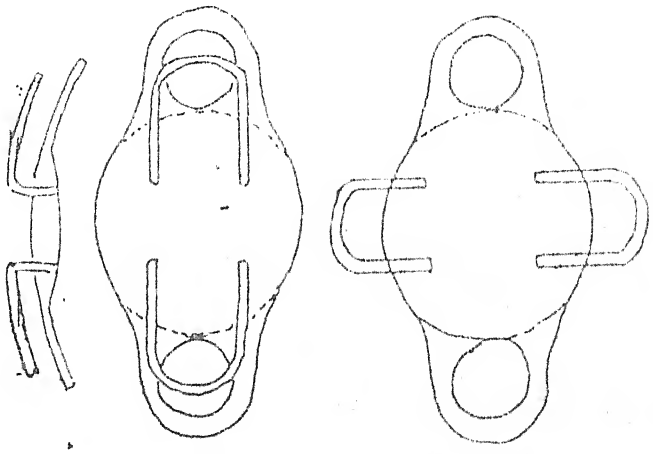


(i)

(b) Mixed type :

(i) Boberg-Ans lens

(ii) Litte-Arnot lens



(i) (ii)

Special synthetic material :

(1) Polymethyl methaacrylate PMMA :

(acrylic, acryglass, plexiglass, perspex)

PMMA is light (specific gravity 1.19) non breakable and durable. It has a high resistance to aging and to climatic change. It is as clear as glass with refractive index of 1.49.

Since 1949 intraocular lenses (IOL) have been made of PMMA. It is even today the material of choice because of its lightness, clarity and stability.

There are five ways to make IOLs from plastic today -

1. Injection moulding of the plastic is performed in a heated condition.
2. In the lathe-cut method the lenses are cutout with a drill from a well aged, long stored PMMA plate.
3. Compression - Polymerization method.
4. Cast moulding method.
5. Compression and lathe-cut method.

(2) Polyamide :

In American literature, nylon is synonymous with polyamides. It has high degree of breakage resistance (tensile-strength).

Polyamide sutures are being used for years to close the cataract wounds and suture iris. In past, they were also used to fix the IOL to the iris.

Nylon 6 (supramid) is used for loops of iris clip lens. There are chances of biodegradation of loop.

(3) Polypropylene (Prolene)

It is used for manufacturing of sutures and of the loops of IOL. It is very light synthetic material.

It is also used to fix lenses to the iris.

Clayman (1981-83) feels that polypropylene is bad in the anterior chamber angle, may be bad in iridociliary sulcus (posterior chamber angle) also.

Yamanaka (1978) and Yamanaka et al (1979) found ultraviolet light also damages polypropylene.

Polymides :

In 1979, a glass lens was introduced that had polymide as its hapted. (Lynell medical technology-New York). The advantages of this lens is that it can be heat sterlized (autoclaved). The optical portion of lens is made of glass.

The popularity of this lens increased till the advent of YAG laser. YAG shattered these lenses and brought about the downfall of these lenses.

Vilas Bidaye (1989) used glass lenses in anterior chamber IOL, ciliary sulcus posterior chamber IOL and 'in-the-bag' implantation. The authors thinks that glass lenses have a good future in India.

Silicon, Polysulfone, HEMA :

Fyodorov et al (1983) and Mazzocco (1983) reported a lens made of medical grade silicon which can be folded and placed through a 3 mm incision.

The silicon lens is introduced in China (Epstein, personal communication, 1984).

Choyce (1983) is experimenting with a flexible lens made of polysulfone. Polysulfone is transparent and extremely heat resistant (260° and higher) so it can be sterlized in steam autoclaved and dry heat; as well as sodiumhydroxide, ethylene oxide and by gamma radiation. It is non toxic. It totally absorbs U.V. rays.

Mehta et al (1978, 1985) reported good results from hydroxy-ethyl methacrylate, HEMA IOLs.

Since June 1984 Epstein has used on HEMA in-the-bag lens with very satisfying results. The lens can be sterlized with heat, gas radiation chemical.

Keiki R Mehta (1989) observed good result in his 50 foldable IOL cases after phacoemulsification cataract extraction.

Visco-elastic substances :

In order to reduce danger of contact between PMMA implant and corneal endothelium visco-elastic substances are used in modern implant surgery.

First Binkhorst in 1973 recommended the air cushion technique to reduce the danger of contact between implant and cornea. Air, however, has the disadvantage that it tends to leave anterior chamber quickly for this reason, Kaufman and Katz (1977) suggested placing a material between lens and cornea that is nonaggressive to the walls of the endothelial cells. Fechner has used methylcellulose in more than 1,000 implantation since 1976 (1977, 1979, 1980, 1982; Feschner, 1983). Possibility this was beginning of modern visco-surgery.

Later 1% sodium hyalmonate (Healon) became available and recently chondroitin sulfate and a diluted form of sodium hyaluronate (Amvisc).

Recently a conbination of sodium hyaluronate and chondroitin sulfate Viscot, is also used.

2% methyl cellulose as a suitable visco-elastic substance was used for almost 10 year by Feschner.

Aron-Rosa et al (1983), Bidaye (1985) Momose and Chu (1985) are in aggreement with him.

Akiza momose and Atsuhiro Kasahara (1989) have used 2% methyl cellulose in 8,000 cases of intraocular implant during the last five and half years. This study convinced them that methyl cellulose is safe and effective beside being convenient and economical. It is easily autoclavable has very low particulate matter and causes minimal rise of intraocular pressure. The endothelial protective function and breakdown of the blood aqueous barrier are comparable to that of Healon. He also observed that in-the-bag placement of the IOL is easier if methyl cellulose is used as compared to more viscous Healon. With Healon the lens tends to be pushed back when placing the inferior haptic in-the-bag specially in a IOL with poly-propylene loops.

However, Healon may be more useful in unusually hard eyes. Healon is also more useful when cataract surgery is combined with keratoplasty i.e. the triple procedure.

COMPLICATIONS OF POSTERIOR CHAMBER LENS IMPLANTATION :

(A) During Surgery :

1. Conjunctival flap - A too large limbus based flap is a hinderance when folded back it make the visualization of anterior chamber difficult. Also a large flap of any kind can contribute to postoperative acquired ptosis(Alpar, 1982). It is better to have a 1 mm conjunctival miniflap, which just allows the lifting of the cornea with conjunctival flap (Castroviejo, 1967). Better yet to have a small fornix based flap that leaves the limbus free of conjunctiva during surgery.

2. Stripping Descemets membrane - During cataract surgery is a common occurrence. The amount of stripping in most instances is minimal and rarely leads to permanent difficulties, except a slight corneal oedema which leads to corneal scar visible only on slit lamp examination. The detachment of Descemets membrane is 1/3 or more will lead to corneal decompensation and therefore, it should be reported by injection of air or cushion material like 1% sodium hyaluronate. If there is large detachment, then the flap is sutured to the cornea with a 10-0 nylon - or polypropylene mattress suture.

3. Hyphaema - It is a common complication during intraocular surgery that is only one should be careful to prevent it from conjunctiva or episclerel vessels by careful curving of limbal incision towards the cornea on either side i.e. 3 o'clock and 9 o'clock. The blood left in anterior chamber can clot easily and rapidly making its removal difficult. It obstructs the proper visibility and can result in drawing up the pupil (Fechner). The source of bleeding may be form iris and Schlemn's canal, Sir Harold Ridley, 1952 reported it in 3.4% cases. In 1977 J.L. Pearce with 140 posterior chamber implant noted total absence of postoperative hyphaema probably due to abandonment of peripheral iridectomies.

S. Bharti et al 1984-1986 reported that it is usually not significant and stops spontaneously.

Subhash P, Kadam 1987 in his series of 146 patient-hyphaema was noted in 8 cases (10.2%).

Kratz et al, 1981 reported 0.1% incidences of hyphaema.

Tony Fernandez et al, 1989 in his 500 cases observed hyphaema in 8 cases (1.6%).

(B) Post-operative complications :

(I) Early Complications:

1. Flat Anterior Chamber - A Shallow or even more or flat anterior chamber is an absolute emergency in eyes that

have any kind of IOL especially anterior chamber ICL or in ciliary sulcus. Contact between IOL and the corneal endothelium is extremely damaging to the corneal endothelium. The majority of such cases occur from wound leak (Alpar & Feschner, 1988).

Daljit Singh et al, 1983 reported the incidence 1.6%. S. Bharti et al, 1984-86 also found 1.6% incidence of shallow anterior chamber.

2. Secondary glaucoma - Rise in intraocular pressure is a multi-etiologic entity, strong watertight wound closure, intensive corticostoroid treatment, cauterization of emissary and aqueous veins, postoperative swelling of the trabecular meshwork in corneoscleral incision, plugging up of meshwork with cortical material and protein, intra cameral methyl-cellulose, chondroitin sulphate and sodium hyaluronate (Alpar and Fechner, 1988).

Sir, Harold Ridley (London) in 1952 observed glaucoma in 1.2% cases.

J.L. Pearce 1976 in his 140 posterior chamber IOL did not observe secondary glaucoma.

Kratz (1977) observed in his 500 cases 0.4% incidence of glaucoma with posterior chamber IOL. In 1979 Dr. David Worthen, Chairman of F.D.A. (Food & Drug Administration Bureau of Medical Devices) in his paper reported 4% incidence of secondary glaucoma.

O.P. Billore (1986) reported 4.26% incidence of high tension in their posterior chamber IOL implant cases (flexible loop) IOL.

R.K. Mishra et al, 1989 reported 3.1% incidence in group of 53 cases.

Tony Fernandez et al (1989) reported 1.8% incidence of secondary glaucoma in his 500 cases.

Most cases of secondary glaucoma correct themselves in a few days but the pressure however, may be high enough to cause permanent damage and visual loss, especially in patient whose optic nerve and intraocular vascular status is already embrassed. For this reason all postoperative glaucoma should be treated with carbonic anhydrase inhibitors, betablocker's, systemic hyperosmotic drugs or reduction of corticosteroids (Alpar Fechner, 1988).

Pupillary block & air block glaucoma are rare in cases of posterior chamber IOL.

3. Ghost cell glaucoma : In some patient's intra-operative haemorrage may occur, as a result of iris or ciliary body erosion, during the insertion of a sulcus fixated posterior chamber IOL implant.

If the large quantity of blood is collected in the vitreous, the degenerated blood cells (Ghost Cells) may float in the anterior chamber and block the tubercular meshwork causing secondary glaucoma.

If medical treatment fails than lavage of anterior chamber and vitrectomy is done to remove these Ghost cells (Feschner, 1988).

4. Striate Keratitis :- Striate keratitis in the early postoperative period suggest traumatic surgery. It is frequently seen after a retroiridal posterior chamber lens implantation, after intracapsular than extracapsular and after phakoemulsification in anterior chamber than phako-emulsification in iris plane.

The longer it takes for the striate keratitis to disappear the more traumatic the surgery was and the worse the prognosis is. It is due to the impairment of fluid pumping function of endothelium (Feschner, 1988).

It is less observed with improvement of extracapsular techniques, avoidence of aspiration of cortical remanants, and reduction of the size of corneoscleral wound from 170 to 100 degree. Maintenance of corneal clarity by contineous irrigation of balanced salt solution incorporating glutathione and adenosine may further reduce the postoperative striate keratitis.

Steroids and hyperostmotic eye drop (5% sodium chloride) will help to clear the cornea but this does not cure the problem since pumping function of the endothelium is impaired. If the endothelial cell can cover the damaged area, the cornea will clear if not then the corneal transplant will became necessary.

O.I. Billore (1986) observed 37.92% incidence of striate keratitis.

Subhash P Kadam (1987) in his 79 posterior chamber IOL implant cases observed 12.6% incidence of keratitis.

Sudhakar J (1989) reported 7.3% incidence of striate keratitis, in his 1000 posterior chamber implants.

Tony Fernandez et al (1989) observed in 15.2% incidence of striate keratitis.

5. Iridocyctitis - Due to surgical manipulation or as a response to transient breakdown of blood aqueous barrier.

J.L. Pearce (1976) in 140 posterior chamber IOL implants found minimal surgical uveitis, with no case of hypopyon or hyphaema.

Kratz in 1977 reported 3.3% incidence of iritis in his 2,500 posterior chamber IOL implant (Shearing type).

Kratz et al (1981) found 3.3% iritis in his 756 'J' loop posterior chamber IOL.

Dr. Worthen in 1979 in a FDA study reported 4.3% incidence of iritis.

Drews studied pearce 138 patients with posterior chamber IOL and found 1.4% cases of iritis.

Subhash P Kadam (1987) reported 7.5% incidence of iritis.

Sudhakar J (1999) reported 4.8% incidence of persistant uveitis.

Tony Fernandez (1989) reported 3.4% incidence of iritis.

This may be minimized by adminstration of prostaglandin inhibition such as indomethacin. The incidence of severe uveitis is decreased markedly with improvement in surgical techniques; better IOL febrication techniques, better IOL design, and the advent of modern IOL ethylene oxide sterilization (Apple D.J. et al, 1984).

6. Infectious endophthalmitis - Usually becomes manifest about 2nd or 3rd postoperative day; exception being staphylococcus epidermides endophthalmitis which manifest after 5th or 6th week of surgery. The fungal endophthalmitis is also a late complication that appear after 2 weeks of surgery.

In 1975 & 1976 two major outbreak were reported by Apple D.J. et al (1984) and Alpar Feschner (1988). The cause of these outbreak was contamination of neutralizing solution (sodium bicarbonate). 13 patients developed fungal endophthalmitis following IOL implants in 1975 and in 1976. 3 cases had pseudomonas aeruginosa endophthalmitis.

Dr. Worthen in FDA study 1979 reported 0.1% incidence of endophthalmitis.

Treatment of endophthalmitis depends on early diagnosis aided by cultures of aspirated vitreous.

Eichenbaun & Co. authors 1978 reported that by treatment all eyes of bacterial endophthalmitis were saved with some retension of vision.

Zaidman and Mondino 1982 have shown that response to treatment and final visual acuity, in five patients with "post implantation bacterial endophthalmitis", did not appear to be related to retention or removal of IOL.

David M. Meisler MD et al (1986) studied 6 cases of chronic propionibacterium aenes endophthalmitis after ECLE and posterior chamber IOL implants.

7. Sterile Endophthalmitis - Toxic lens syndrome - it may occur in first several days following IOL surgery and manifest as a sterile hypopyon and vitreous opacification in single or mixed form of variable duration and severity. The eyes are relatively painless, hardly red and little or no chemosis is present (Alpar, 1982).

Alpar D.J. et al (1984) reported 7% incidence in dry pack and 15% in case of wet pack sterilized IOLs.

This problem is less frequently countered now a days due to improved manufacturing techniques.

8. Precipitates on IOL and Anterior Vitreous face : Alpar Peschner 1988 observed pigments on IOL and on anterior vitreous face which usually disappeared in few weeks or months. Their reappearance signifies a flare up of uveitis and might be a first sign of CME. The best way to prevent the formation of precipitation of any kind (pigment, blood, cell, protein etc) is careful control of bleeding during surgery, atraumatic surgery and control of postoperative inflammation.

Apple D.J. (1984) stated that this occur expecially during the immediate post-operative period and frequently clears spontaneously as the operated eye quiets down but if inflammation continues or haemorrhage occurs such as in UGH syndrome, the precipitate may coalesce and becomes sufficiently dense as to cause diminushed vision.

O.P. Billore, M.A. Kurram, A.P. Shroff Nausari (1986) reported 31 cases (43.59%) of pigmentary deposit over IOL implant.

II. POST OPERATIVE COMPLICATIONS - Late Complications +

1. Lens Dislocations - There are several names of describe dislocation of the retroiridal posterior chamber lens -

(a) Captive iris syndrome - is the condition in which the iris slips behind one or both edges of lens. It occurs with lenses close to the iris, such as Simcoe or original

floating lens. If left alone, the pupil remain distorted (Cat's Eye Pupil) and eventually after several months - year, it might lead to sphincter damage, iris fibrosis, haemorrhage or glaucoma.

For therapy in such cases during Ist postoperative day, in some cases censervative response might succeed. The pupils are to be dilated and, if necessary pressure has to be applied with swabs over the sclera, over the tip of the loops. Once the lens is in proper position , the pupil has to be narrowed with pilocarpine or another drug. Usually however, surgical intervention is needed.

(b) Windshield wiper syndrome - The windshield wiper syndrome is a pendulum like shifting of the lens back and forth when, due to a too short lens (13 or even 13.5 mm) iridociliary fixation did not develop. Such lenses may be immobilized by the method of Dardenne or with double Mc Cannel sutures or they might need to be removed and replaced with a 14 mm or 14.5 mm diameter lens.

(c) Sunset & Sunrise syndrome : Sunset syndrome is the dislocation of a retroiridal posterior chamber lens into vitreous. This usually happens with a sulcus fixated lens if the zonule were damaged and the lens was not rotated or, in same cases even it was or if the lens was implanted in an with extensive, but unrecognized damage to posterior capsule.

The subluxated lens may irritate ciliary body causing pain, low grade uveitis and cystoid macular oedema.

Often it is possible to retrive such a lens with an iris hook. The optical part can be dislocated into anterior chamber, achieving in effect, double captive iris, and superior and inferior loops can be sutured to the iris with Mc Cannel suture. Some time lens slips out of vitreous with ease or of extensive vitrectomy needs to be done, a replacement of 'J' loop posterior chamber lens with an anterior chamber angle fixed lens or an iris claw lens might be more advantageous.

J.L. Pearce in 1976 in his 140 posterior chamber IOL implant observed 3% incidence of anterior dislocation of implant within 2 days of surgery.

FDA study in 1979 mentioned 0.4% incidence of IOL dislocation.

Sudhakar J, in 1989 reported 2.8% incidence of malposition of IOL in his 1000 cases.

2. <u>Intermittent touch syndrome and IOL corneal touch</u> -

This syndrome between retroiridal fixed lens and corneal endothelium leads to continuing loss of endothelial cells and permanent corneal and often macular damage.

Drews 1982 described the syndrome of intermittent touch as triad of findings - ciliaryflush, localized corneal changes and macular damage.

This is absent with endocapsular posterior chamber IOL implants.

3. Cystoid Macular Oedema - It is a well known complication of cataract extraction occuring more often with intracapsular than extracapsular extraction. It is not completely clear whether CME with result of an increased permeability of perifoveolar capillaries, is caused by ischaemic injury, is secondary to ocular inflammation or from direct traction from as the macula following vitreous shift. There may be a contribution of factors.

A relationship to anterior segment inflammation associated with prostaglandin release and concurrent corneal decompensation and CME (the corneal-retinal inflammatory syndrome) has been reported by Obstbaum & Galin in 1979. Galin 1977 reported that approximately 70% of affected patient will have spontaneous resolution with visual improvement.

Kratz 1977 observed 2.1% incidence of CME in his 2500 posterior chamber Shearing type IOL implant.

The Miami study group 1979 concluded 4% incidence of angiographic CME.

of affected patient will have spontaneous resolution with visual improvement.

Kratz 1977 observed 2.1% incidence of CME in his 2500 posterior chamber Shearing type IOL implant.

The Miami study group 1979 concluded 4% incidence of angiographic CME.

Jaffe 1982 found 0.4% incidence of clinical EME (V/_ 20/50) in posterior chamber IOL implant.

Kraff and Coauthors,1981 reported 18.5% of angiographic CME in 108 patients who had ECCE or Kelman phacoemulsification with primary capsulotomy and posterior chamber implantation. Majority of angiogram were performed between 2 to 5 month after surgery and the incidence of overall clinical CME was approximately 4%.

Taylor and Coauthors in 1984, in 1808 cases found an incidence of 1.2% of clinical EME.

Tony Fernandez 1989 in his 500 posterior chamber IOL implant (endocapsular) observed, Cystoid macular oedema in 8 cases (1.6%).

To date, no adequate treatment or prophylaxis of clinical CME has proven effective. Several reports regarding the effect of corticostroids and prostaglandin inhibitors such as indomethacin in treating CME has published. Results have been somewhat, encouraging but inconclusive.

4. Adhesion between iris and posterior chamber (Retroiridal) lens -

This is observed in posterior chamber lenses especially those that sit close to the iris such adhesion can be between lens and the pupillary margin or iris, more adhesion, however, are between the anterior capsular rim or anterior capsular tags and the iris (Dickerson, 1984). The signs are limitations of pupillary dilatation infront of adhesions or a groove formation between iris substance and the area around the edge of IOL.

The use of angulated lenses, especially of the convex surface is facing the posterior capsule. Jacobi lindstrem lens greatly reduces the occurrence of this complication.

5. Thickening and opacification of posterior capsule -

Opacification of the posterior capsule is a common complication of extracapsular cataract extraction. Children and young adults seem to be more prone to this complication, over a period of 5 to 10 years. However, 30-50% of the posterior capsule may thicken, fibrose and opacify. If visual imparement occurs these tissue must be opened atleast in the visual axis. This can be accomplished with needdles, fine needle knives, and with neodymium YAG laser. In very heavy membrane if the YAG laser is not available pars plana vitrectomy and membranectomy might be necessary.

O.P. Billore (1986) reported 33 cases (45.29%) of remainants of lens matter in their posterior chamber IOL implant cases.

Subhash P Kadam (1987) reported 15.1% incidence of posterior capsule thickening.

Sudhakar J. et al (1989) in his 1000 posterior chamber IOL implant cases observed 11.5% incidence of late posterior capsule opacification.

Tony Fernandes (1989) in his 500 endocapsular intra-ocular implant observed 11.6% incidence of thickening of posterior capsule.

6. Visual results - Ridley (1952) reported in his 60 cases 50% had 20/30 or better vision.

J.L. Pearce (1976) in his 140 posterior chamber IOL observed 73% cases, achieved visual acuity 6/9 or better without spectacle correction.

Sudhakar J, Ravindran RD and Natchiar G (1989) in 1000 cases of post chamber IOL implant observed good visual acuity i.e. 6/6 to 6/9 in 57.1% cases, 6/12 to 6/18 in 31.5% cases, 6/24 to 6/60 in 6.2% cases, $\angle$ 6/60 in 2.2% cases.

Tony Fernandez et al in 1989 in his 500 posterior chamber endocapsular implants observed good visual acuity in more than 80% cases i.e. 6/6 or better in 30.4%, 6/9 to 6/18 in 52.2%, 6/24 to 6/60 in 12.2% and $\angle$ 6/60 in 4.2% cases.

Keiki R, Mehta (1989) in his phacoemulsification cataract extraction with foldable IOLs first 50 cases observed excellent visual results (6/9 or better) in 78% cases, 6/12 to 6/18 in 8% and 6/24 to 6/36 in 24% cases.

7. Retinal detachment - The frequency of retinal detachment is about the same for pseudophakic and aphakic eye. There is however, a significant difference between routine uncomplicated intracapsular 3% and extracapsular 0.9% (Peschner & Alpar, 1988).

Percieval et al (1983) reported the similar results.

Kratz in 1977 reported 1.3% incidence of retinal detachment after 3 month to 4 years followup of his 2500 Shearing type posterior chamber IOL implant.

The FDA study in 1979 reported 0.3% incidence of retinal detachment.

Wollensak J (1988) in a series of 6,000 patient, who had undergone extracapsular cataract extraction and Simcoe type posterior chamber lens, the incidence of retinal detachment was 0.33% (21 cases).

8. Light maculopathy, erythropsia - Although the natural lens filters the greater part of ultraviolet light out, the PMMA hardly present a barrier and the cornea filters only about 20% of the near ultraviolet light to the retina. Erythropsia (pink vision is an acute phenomenon) that occurs to a patient with an ocular system that does not filter out the near ultraviolet rays. Repeated attacks of erythropsia almost surely will lead to permanent damage of the retina due to macular oedema (Feschner & Alpar, 1988).

Until the safety of ultraviolet filter IOL is established one many consider using the ordinary IOLs and fitting ultraviolet filtering spectacles (Feschner,1980).

....

AIMS OF STUDY

1. To perform ECLE with posterior chamber lens implantation.

2. To assess the postoperative final visual acuity in posterior chamber lens implantation.

3. To record the complication in intraocular posterior chamber lens implantation, if any, after surgery.

***

MATERIAL & METHOD

MATERIAL & METHOD

The present study was carried out in the department of Ophthalmology, M.L.B. Medical College Hospital, Jhansi. In 21 patients, posterior chamber IOL implantation was done after extracapsular cataract extraction.

The patients selected for posterior chamber IOL were senile cataracts with & willingness for IOL implantation.

A detailed general and ocular history of the patient was taken with special reference for any history of hypertension, diabetes, asthma, rheumatoid arthritis cerebrovascular insufficiency or septic focus. In ocular history special attention was given on the refractive condition of the eye prior to the development of cataract.

A detailed general examination of the patient was done with special attention for any sign of diabetes, hypertension, rheumatoid arthritis, asthma, thyroid disease-cerebrovascular insufficiency, enlarged prostate and psychiatric problems.

Thorough local examination of all the patients was carried out by focal illumination, slit lamp examination and retinoscopy, fundus examination, if possible, and intraocular tension was recorded.

Patients who were having diabetes, corneal endothelial dystrophy, iritis, iris atrophy, corneal opacity, keratitis, glaucoma, high myopia, complicated cataract, keratoconjunctivitis sicca, and any history of retinal detachment and single eyed patients were not selected for IOL implantation.

INTRAOCULAR LENSES :

Modified 'J' loop Shape (Shah & Shah) posterior chamber lenses were used with following characteristics -

Model - 104

Modified 'J' loop posterior chamber lens with a 6.0 mm UV - absorbing optic, two PMMA loops, 10 degree angulation, 4 positioning holes, 14.0 mm length, A constant - 116.8

ACD (mm) 4.2

These lenses are sterlized by ethylene oxide, dry packed and made up of polymethyl metha-acrylate.

DETERMINATION OF POWER OF IOL TO BE IMPLANTED :

(i) A detailed history regarding refraction of the eye prior to the development of cataract was taken and the power of lens to be implanted was calculated by the following formula devised by R.C. Drews, 1977. The power of posterior chamber intraocular lens is 20 D + (Primary refractive error x 1.25).

(ii) Retinoscopy was carried out on the operation table after lens extraction visilon was injected into the anterior chamber and retinoscopy was done. Then the appropriate intraocular lens is selected.

(iii) In more advanced centre suitable power of IOL is calculated by using a special formula which incorporates keratometry readings and the length of the globe as determined by A-Scan ultrasonography. The A constant used in the formula is different according to which type of IOL is to be implanted.

= SRK = $P = A - 2.5L - 0.9\ K$

A = Constant of lens implant

P = Power of lens

L = Axial length

K = Keratometry reading.

Preoperative preparation :

The night before operation patients were given mild sedation with Diazepam tablet, Diamox 500 mg for reducing intraocular pressure, antibiotic eye drops were instilled one day prior to operation.

In the morning, prior to operation pupil was dialated with instillation of Drosyn 10% and homatropine and tab. Diamox given 2 hrs before operation. On the operation table I.V. 20% mannitol 250 ml was given about 20 minutes before operation.

Anaesthesia :

(1) Topical 4% lignocain as drops.

(2) Facial block by lignocain 2% with adrenaline 1 : 100000.

(3) Retrobular block with lignocain 2% alongwith adrenaline 1 : 100000.

Operative Steps :

Part prepared and drapped, lid sutures (upper & lower) were given then superior rectus fixation suture was applied and fixed. A small limbus based conjunctival flap was made and bleeding vessels were cauterised with the help of heat cautery. Small limbal section was made at 12 o'clock position with the help of razor blade (Bharat blade). Anterior lens capsuletomy was done with sharp cystitome made out from a sharp disposable hypodermic needle by multiple incisions at peripheral part of anterior lens capsule and anterior lens capsule was removed with forceps. Limbal incision was enlarged from 3 o'clock position to 9 o'clock position and the nucleus was expressed by bimanuel expression method. Three corneoscleral temporary suture were given at 3 mm interval. Then cortical matter was washed out with the help of two way canula (irrigation aspiration) in closed chamber technique. Balanced salt solution mixed with adrenaline was used as irrigating solution. Polishing of posterior lens capsule done if necessary.

Methyl cellulose (visilon 2%) introduced in the chamber to protect the corneal endothelium. Now posterior chamber intraocular lens was implanted and dialled into the horizontal position by engaging the guide holes with a special hook. One P.B.I. at 2 o'clock position was done and injection pilocarpine was injected into anterior chamber to constrict it and to ensure that the optic is behind the iris. Methyl cellulose was washed out from chamber by B.S.S. solution.

The incision was closed with 5-7 interrupted corneoscleral sutures of 9-0 monofilament and suture knots were burried. A.C. was formed by small amount of sterile air injection. Sub-conjunctival injection of Decadron and Gentamycin was given and dressing was done with neospirine-H eye ointment and timolol meleate 0.5% eye drops.

The intraoperative complications were recorded.

Postoperative treatment :

All the patients were given -

- Cap. Chloromycetin	- 1 QDS	3-5 days
- Tab. Ibuprofen	- 1 TDS	
- Tab. B Complex	- 1 BD Pc	

Daily dressing was done with neosporine H ointment and with timolol maleate 0.5% eye drops for 3-5 days and complications were recorded. The patients were discharged after 3 days.

After the discharge the followup was done weekly for one month. Lateron followup was done fortnightly for 6-9 month.

During the period of followup and at the time of discharge a detailed local examination was carried out as shown in attached proforma.

@*@*@*@

OBSERVATIONS

OBSERVATION

The present study is based on 21 patients which were analysed. These patients were admitted in Ophthalmics wards of M.L.B. Medical College Hospital, Jhansi. These posterior chamber ICL implantation.

These study were carried out from operative period to postoperative period followup for 6-9 months since July, 1990 to July, 1991.

Out of 21 cases most of them were mature cataract. The total number of mature cataract were 16, immature 4, and traumatic cataract 1. The diagnosis of different type of cataract is shown in table - 1 and condition of other eye has been shown in table 2.

Table - 1

Diagnosis of different type of cataract

Sl. No.	Diagnosis	No. of cases	Percentage
1.	Mature cataract	16	76.2
2.	Immature cataract	4	19.1
3.	Traumatic cataract	1	4.7
	Total	21	100.0

Table - 2

Condition of other eye

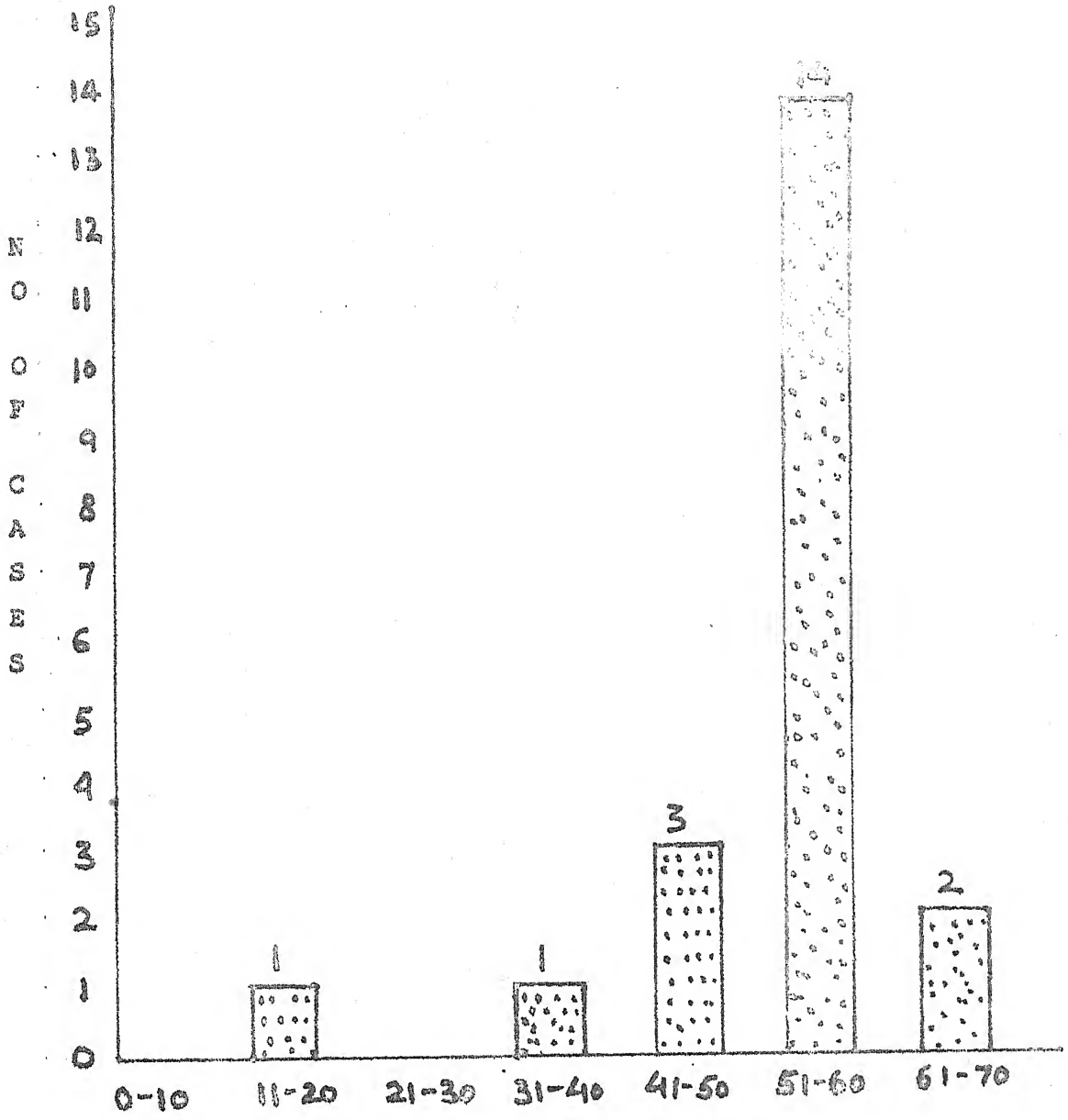
Sl. No.	Diagnosis	No. of cases	Percentage
1.	Normal	05	23.8
2.	Mature cataract	02	09.5
3.	Immature cataract	13	62.0
4.	Pseudophakia	01	04.7
5.	Aphakia	-	-
	Total	21	100.0

The table - 3 shows the distribution of age and sex of the patients. Most of the cases are male and the youngest patient in the study group was 20 years old and the eldest was 68 year old and the average age was 60 years out of these cases 15 are male and 6 are female.

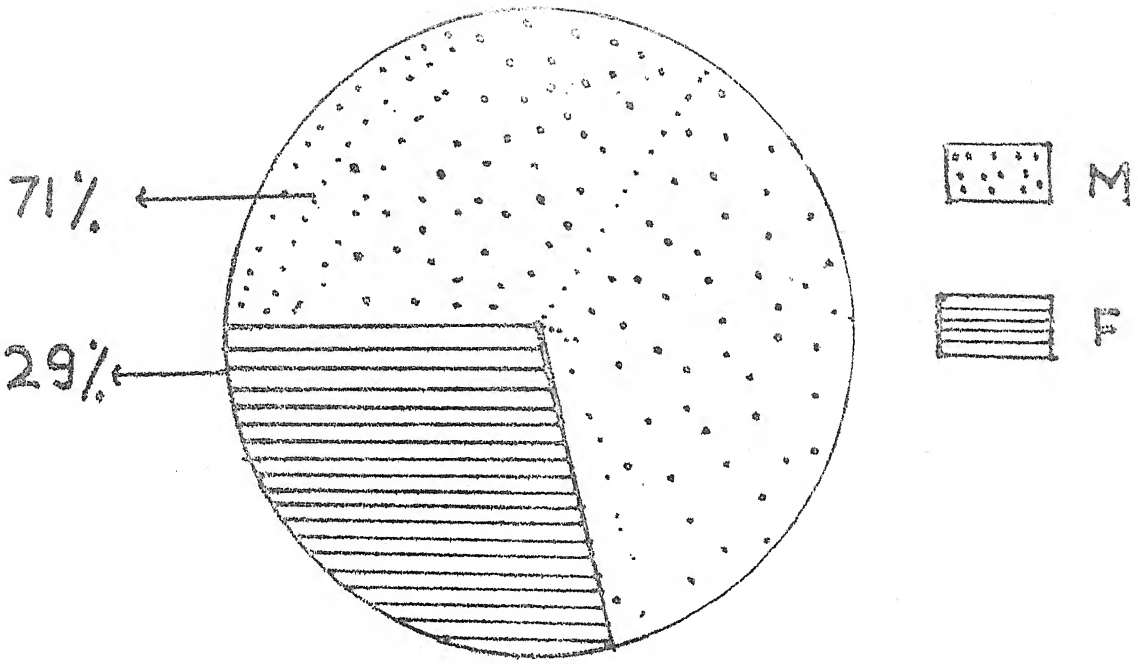
Table - 3

Distribution of age & sex of the patients

Sl. No.	Age group	Sex				Total	
		Male		Female		No.	%
		No.	%	No.	%		
1.	0-10	-	-	-	-	-	-
2.	11-20	1	4.7	-	-	1	4.7
3.	21-30	-	-	-	-	-	-
4.	31-40	1	4.7	-	-	1	4.7
5.	41-50	2	9.5	1	4.7	3	14.2
6.	51-60	10	47.0	4	19.0	14	66.0
7.	61-70	1	4.7	1	4.7	2	9.5
	Total	15	71.0	6	29.0	21	100.0



AGE DISTRIBUTION (IN YEAR)



SEX DISTRIBUTION

Complications occuring at the time of operation has been shown in the table no. 4 (cases with retrobulbar haemorrhage; vitreous loss, big rupture of posterior lens capsule were excluded from present study.

Table - 4

Incidence of peroperative complications

Sl. No.	Peroperative complication	No. of patients	%
1.	Corneoscleral wound	-	-
2.	Hyphaema	2	9.5
3.	Remnants of lens matter	2	9.5
4.	Inadvertent rupture of post. capsule	1	4.7
	Total	5	23.7

1. Hyphaema :

Two cases (9.5%) hyphaema occured. It developed after iridectomy and also when iris was separated from lens where posterior synechia was formed in a case of perforating injury. It resolved within one week with the treatment by giving Tab. Diamox and hemestatic drugs.

2. Remnants of lens Matter :

In 2 cases (9.5%) lens matter was left behind. In one case of perforating injury, it was probably due to the fibrous metaplasia of lens fibres which were difficult to remove by irrigation and aspiration. In other case lens matter was left at 1 o'clock and was difficult to remove. However, it was not present in visual axis.

3. Inadvertent small rupture of posterior capsule :

In one case (4.7%) small posterior capsule rupture was found. It was accidental rupture of posterior capsule during lens irrigation and aspiration.

Table - 5

Incidence of early postoperative complications

Sl. No.	Postoperative complication	No. of patients	%
1.	Striate keratitis	5	23.8
2.	Corneal oedema	1	4.7
3.	Iritis	4	19.1
4.	Hyphaema	-	-
5.	Dislocation of lens	-	-
6.	Raised intraocular pressure	1	4.7
7.	Remnants of lens matter	1	4.7
8.	Excessive Pigmentary deposits on IOL	2	9.5

In the early postoperative complication the striate keratitis was present in 5 (23.8%) cases. It resolved in most of the cases in a period of 5-7 days except in one case it persisted for longer time.

Corneal oedema was found in one case and it subsided within a week time.

Iritis was noticed in 4 (19.1%) cases. In most of cases it improved within 2-3 weeks with the treatment of subconjunctival injection of Decadron, Inj Gentamycin alongwith tropical corticosteroid, Drosyn 10%, antibiotic drops and systemic, antibiotic, antiinflammatory and corticosteroid drugs, except in one case it persisted too longer upto 3 months.

Postoperative hyphaema was nil in our cases.

Raised intraocular pressure was found in one (4.7%) case. It was due to iritis and due to retension of some cortical lens matter. The raised tension subsided after few day.

Remnants of lens matter was found in one case (4.7%). This case was of perforating injury in which lens cortex was thick and did not absorb in postoperative period.

Excessive Pigmentary deposits were seen in two cases (9.5%).

Table - 6

Complication in late postoperative period

Sl. No.	Complication	No. of case	%
1.	Endothelial corneal dystrophy	-	-
2.	Cystoid Macular oedema (CME)	-	-
3.	Retinal detachment	-	-
4.	Uveitis, glaucoma, hyphaema, syndrome	-	-
5.	Iris atrophy	-	-
6.	Adhesion between iris and IOL	-	-
7.	Persistant iritis	1	4.7
8.	Thickening of posterior lens capsule	1	4.7
9.	Excessive Pigmentary deposit on IOL	2	9.5

- Persistant iritis was present in one case (4.7%). It was associated with raised intra-ocular pressure. It subsided after 3 month with the medical treatment.
- Thickening of posterior lens capsule was present in one case (4.7%) of perforating injury.
- Pigmentary deposits on IOL were present in two cases (9.5%) which remain persisted for 6-8 weeks without leaving ill effect on vision.

Table - 7

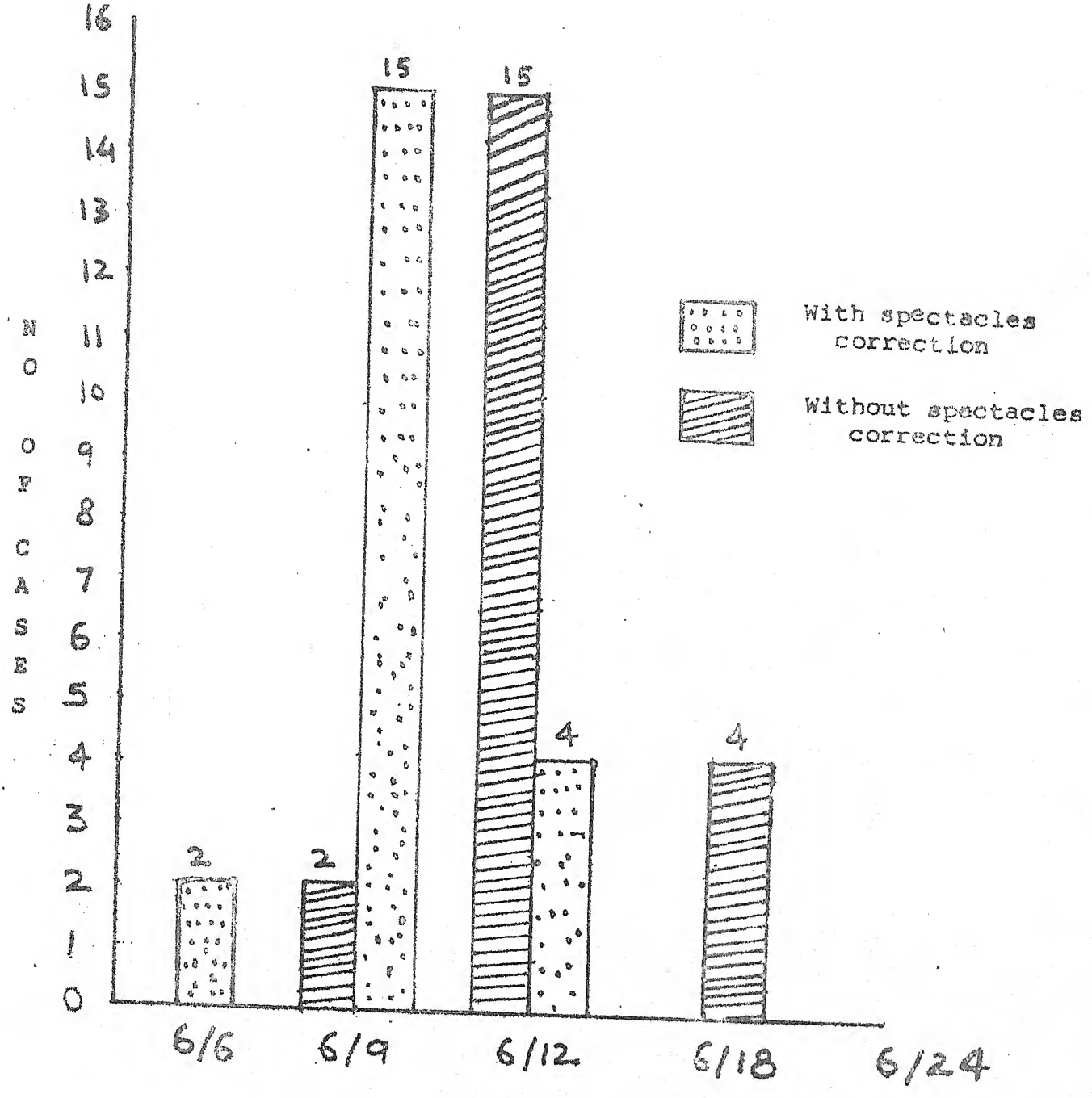
Visual acuity

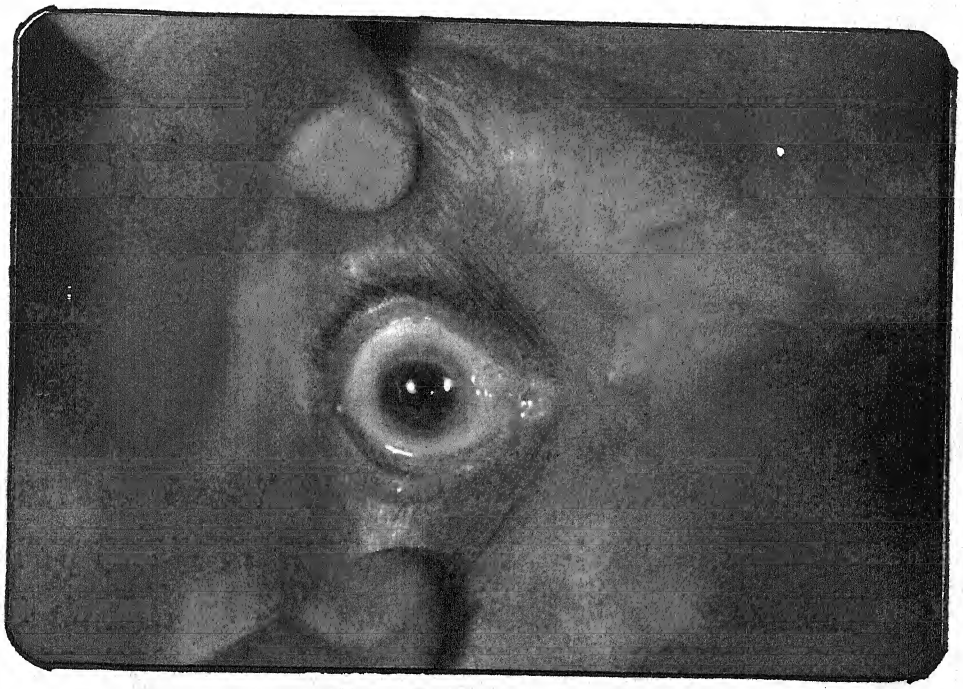
Sl. No.	Visual acuity	Withoug spectacles correction		With spectacles correction	
		No.	%	No.	%
1.	6/6	-	-	2	9.52
2.	6/9	2	9.52	15	71.43
3.	6/12	15	71.43	4	19.05
4.	6/18	4	19.05	-	-
5.	6/24	-	-	-	-
6.	6/36	-	-	-	-
	Total	21	100.00	21	100.00

The final visual acuity with spectacle lenses were recorded 6 weeks after operation. Out of these 21 patients, 17 patients has good binocular vision and the rest four patients could not achieve binocularity as they were having mature cataract and advanced immature cataract in the other eye. All the patients resumed their normal routine work after a period of 6 week after the operation.

Thus in about 80.95% cases the final visual acuity improved to 6/9 or better than this, while in 19.05% cases final visual acuity improved to 6/12 with spectacle lenses. Out of these 80.95% cases 2 patient had 6/6 vision with the spectacle lenses.

..***..


16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
NO OF CASES
15
15
2
2
4
4
With spectacles correction
Without spectacles correction
6/6
6/9
6/12
6/18
6/24
VISUAL ACUITY



POSTERIOR CHAMBER INTRAOCULAR LENS IMPLANT IN MALE PATIENT (Rt. Eye) VISION 6/6 WITH CORRECTION AFTER 6 WEEKS.

DISCUSSION

DISCUSSION

Cataract extraction is the most common surgical procedure in ophthalmology now a days. It leads to aphakia which can be corrected by suitable spectacle lenses or various contact lenses or by intraocular lens implantation. Out of these methods of aphakik correction by the posterior chamber IOL implantation is most suitable method now a days.

These intraocular lens implantations are associated with some complications in addition to the complications of simple cataract extraction.

Now with the major improvement in micro-surgical technique, lens materials and lens design led to the increasing use of posterior chamber lenses since 1975 till date.

The posterior chamber lens has got the added advantages :

1. Closer to point of rotation, more stability, less flutter, glitter.
2. Closer to nodal point; better optical results, less aniseikonia.
3. Relative easy insertion and one size fits almost all and less chances of dislocation.

4. Primary and secondary implantation possible.
5. Less damaging to tissue once in place.

In the present clinical study of posterior chamber lens implantation peroperative and postoperative complications were noted in 21 cases within a period of 6-9 months.

Complication during Surgery :

Hyphaema was seen in two cases (9.5%) which get resolved within one week in present study. Harold Ridley (1952), Subhash P. Kadam (1987), Tony Fernandez (1989) reported the incidence of hyphaema 3.4%, 10.2% & 1.6% respectively. This is similar to the study of Subhash P. Kadam (1987), but higher to the study of H. Ridley (1952) and Tony Fernandez (1989). S. Bharti et al (1984-86) reported that hyphaema is usually not significant and stops spontaneously.

Remnants of lens matter noted in 2 cases (9.5%) which is lower as compared to O.P. Billore (1986), who reported in 33 cases (45.29%) in his study.

Small rupture of posterior capsule was noted in 1 case (4.7%) in which posterior chamber lens could be implanted. This is slightly higher than results of Tony Fernandez (1989), who reported 12 cases (2.4%) of small posterior capsule rupture in which posterior chamber IOL could be implanted.

Early postoperative complications :

In present study striate keratitis was observed in 23.8% cases, while Sudhakar J, Ravindran RD and Natchiar (1989) reported in 7.3% cases; Subhash P Kadam, Baroda (1987) reported striate keratitis in 12.6% cases; Tony Fernandez (1989) observed 15.2% incidence of striate keratitis in his 500 patients.

In the present study slightly higher incidence of striate keratitis was observed which could be due to unavailability of very refined micro-surgical instruments. So that there was excessive handling of cornea during lens implantation.

Corneal oedema was present in 1 case (4.7%) in my present study. Sudhakar J, Ravindran RD and Natchiar (1989) reported incidence of corneal oedema in only 1.7% cases. The most probable cause could be the trauma to the cornea during irrigation & aspiration of lens cortex.

It was mild and subsided within a week.

Iritis in early postoperative period was observed in 5 cases (23.8%). In most cases it resolved within 2-3 weeks with the treatment except in 1 case in which it persisted upto 3 months.

Kratz (1977) observed 3.3% incidence of iritis in his 2500 cases, Subhash P. Kadam (1987) reported 7.5% incidence of iritis in his 79 cases. Sudhakar J, Ravindran RD and Natchiar (1989) reported 4.8% incidence of iritis while Tony Fernandez (1989) reported 3.4% incidence of iritis in his study of posterior chamber lens implantation.

The incidence of iritis is higher in my study than the other studies. The cause of this high incidence could be inadequate treatment of iritis during postoperative period because patient did not come for regular followup as well as due to excessive handling of iris during irrigation aspiration procedure.

Remnants of lens matter was found in 1 case (4.7%). This case was of perforating injury in which lens cortex was thick and did not absorbed fully during postoperative period.

O.P. Billore, M.A. Khurram and A.P. Shroff (1986) were reported 45.29% incidence in their study, so my results are lower than this study.

Raised intraocular pressure was found in one case (4.7%). It was the case of perforating injury and was due to iritis as well as due to retention of some cortical lens matter blocking the trabecular meshwork. F.D.A. study 1979 and Dr. O.P. Billore reported similar results

of raised intraocular tension i.e. 4% and 4.2% respectively. It was subsided with medical treatment after 3 month.

Pigmentary deposits on IOL were found in 2 cases (9.5%). It was lower than the results of O.P. Billore, M.A. Khurram and A.P. Shroff (1986) who reported 43.59% cases. Moreover, it got absorbed after 6-8 week period without leaving ill effect on vision.

Late postoperative complications :

Persistent iritis was present in one case (4.7% in present study. It was associated with raised intraocular pressure. It subsided after medical treatment in a period of 3 months.

Similar results were noted by Sudhakar J, Ravindran RD, and Natchiar who reported 4.2% cases of persistent iritis.

Thickening of posterior lens capsule was observed in 1 case (4.7%). Sudhakar J, Ravindran RD and Natchiar (1989) reported 11.5% incidence of posterior capsule thickening, however, Tony Fernandez and Subhash P. Kadam (1987) reported 11.6% and 15.1% incidence of posterior capsule thickening respectively in their posterior chamber intraocular lens implant cases. This was the case of perforating injury. This can be due to the fibrous metaplasia of lens fibres which were difficult to remove by irrigation and aspiration but it was not in visual axis hence not disturbing the vision. However,

it is too early to comment on posterior capsular thickening as followup of 6-9 month was short time and patient did not come for proper followup.

Excessive pigmentary deposits over IOL were found in 2 cases (9.5%) which persisted for 6-8 weeks. The incidence was lower than the results of O.P. Billore, M.A. Khurram and A.P. Shroff (1986) who reported higher incidence of pigmentary deposits in their study.

Visual achievements :

In present study the postoperative visual acuity achieved is 6/6 in 2 cases (9.5%), 6/9 in 15 cases (71.43%). 6/12 in 4 cases (19.05%) and after spectacle correction i.e. 80.95% cases achieved vision 6/9 or better.

Almost similar results of visual acuity was reported by Tony Fernandez, Sebastian Pious and Noel Moniz (1989) in their 500 cases of posterior chamber lens implantation.

6/6 or better in 30.4%, 6/9 to 6/18 in 52.2%,
6/24 to 6/60 in 12.2%, $\angle$ 6/60 in 4.2% cases.

Keiki R Mehta (1989) reported similar results of visual acuity in 50 cases i.e. 6/6 - 6/9 in 78%, 6/12-6/18 in 8%, 6/24-6/36 in 24%.

However, Sudhakar J, Ravindran RD and Natchiar G, reported slightly less visual acuity results in their

posterior chamber lens implantation i.e. 6/6-6/9 in 57.1% cases, 6/12-6/18 in 31.5% cases, 6/24-6/60 in 6.2% cases, 6/60 in 2.2% cases.

Hence final visual acuity achievement in my cases was very near to the results reported by other workers in their studies.

@*@*@*@*@*@

SUMMARY

SUMMARY

Development of cataract is usually normal aging process most of the time and if it is not treated; may cause diminution of vision as well as other ocular complications also. In modern days the best method of treatment of cataractous lens is its surgical removal which is leading to development of aphakia. This aphakia is corrected by various methods but the recent most accepted method is posterior chamber intraocular lens implantation.

But lens implantation is itself not free from the postoperative ocular complications. However, the results are excellent if it is done in expert hands.

The present study entitled "A clinical study of Posterior chamber intraocular lens implantation" was carried out in the department of Ophthalmology, M.L.B. Medical College, Jhansi.

Twenty one patients were admitted from O.P.D. of Ophthalmic department for extracapsular cataract extraction and posterior chamber intraocular lens implantation and case were followed upto 6-9 months after discharge from the hospital. The complications were noted as early postoperative complications i.e. upto one week, and late postoperative complications i.e. after one week.

Patients having diabetes, hypertension, arthritis, and thyroid disease were not selected for IOL implantation cases having any ocular inflammation, glaucoma, corneal disease or single eyed patients were not selected for IOL implantation.

Flexible open loop posterior chamber lenses of 'J' loop shape (Shah & Shah) were used in this study.

The following complications were detected in this study :-

Intra-operative hyphaema in two (9.5%) cases, remnants of lens matter in two (9.5%) cases, and inadvertent small rupture of posterior capsule in one (4.7%) case.

All these complications were resolved with routine medical treatment without having any ill effect.

Early post-operative complication :

Striate keratitis was encountered in 5 cases (23.8%). This disappeared in all cases within 5-7 days.

Corneal oedema was seen in one case (4.7%) and it got cleared within a week.

Iritis was present in 5 cases (23.8%) and resolved in 2-3 week time except in one case which persisted for three months.

This case also responded well to the treatment and had good visual acuity.

Raised intraocular pressure was seen in one case (4.7%) which was controlled after medical treatment for 3 months.

Remnants of lens matter was found in one case (4.7%).

Excessive pigmentary deposits over IOL were found in 2 cases (9.5%) which persisted for 6-8 weeks.

Late post-operative complication :

Persistent iritis was present in one case (4.7%) which also resolved after 3 months with the treatment.

Thickening of posterior lens capsule observed in one case (4.7%) which was not involving visual axis so visual achievement was good in this case.

Excessive pigmentary deposits over IOL seen in two cases (9.5%), which were cleared after 6-8 week without leaving ill effect on vision.

Visual acuity results after spectacle correction were as follows -

6/6 in 9.52%, 6/9 in 71.43%, 6/12 in 19.05% cases good binocular vision was obtained by 80.95% cases.

****

CONCLUSIONS

CONCLUSION

The following are my conclusions of this clinical study :-

1. For the correction of aphakia following cataract surgery posterior chamber lens implantation is best among other methods of aphakic correction.

2. Good visual acuity and binocular vision achievement alongwith no enlargement of image are certain advantages of posterior chamber IOL.

3. As a result of good visual achievement patients were able to resume their duties quite early.

4. To perform posterior chamber lens implantation is slightly difficult, time consuming and require more experience, operating microscope and other modern instruments.

5. Main early postoperative complications are striate keratitis and iritis while main late postoperative complications are iritis, posterior lens capsule thickening and excessive pigmentary deposits over IOL.

6. Complication like dislocation of lens, corneal decompensation, pupilliary capture, CME, decentrering of lens were not observed in present study.

7. I conclude that extracapsular cataract extraction with posterior chamber intraocular lens implantation is a quiet safe procedure in expert hands and in properly selected cases gives good results. It can be performed routinely in our hospital.

@@@@@

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 6 : 41-44, 1988.

2. Alpar JJ, Fechner PU : Fachner's Intraocular lenses, 163-172, 1988.

3. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 7.5 : 56-57, 1988.

4. Alpar JJ : Acquire ptosis following cataract and glaucoma surgery. Glaucoma, 4 (92) : 66-68, 1982b.

5. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 25.2 : 247, 1988.

6. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 25.2 : 347-48, 1988.

7. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, Complications of lens implant, 25.3 : 355-56, 1988.

8. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 25.4 : 359, 1988.

9. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 13.6 : 155, 1988.

10. Alpar JJ, Fechner PU : Fechner's Intraocular lenses, 25.5 & 6 : 390-400, 1988.

11. Apple DJ, Nick Mamlis, Katherine Loftfield : Complication of Intraocular lenses. A historical and histopathological review, surv Ophthalmol, 29 : 1-56, 1984.

12. Apple DJ : Complication of Intraocular lenses, Survey of Ophthalmol, 29 : 1, August, 1984.

13. Apple JJ, Fechner PU : Fechner's Intraocular lenses, 4-5, 1988.

14. Arch of Ophthalmol, 104, August, 1986 : IOL implantation.

15. Barraquer J : The use of plastic lenses in the anterior chamber : Indication, techniques, personal results. Trans Ophthalmol Soc UK, 76 : 537-49 : 1956.

16. Benjamin SW : Comparison of Intracapsular and extra-capsular cataract extraction with and without lens implantation. Am Intraocular Implant Soc, J, 3 : 202, 1977.

17. Bidaye V : Glass lens implant. Ind J Ophthalmol, 37 : 84-85, 1989.

18. Binkhorst CD : Evaluation of intraocular lens fixation in pseudophakia. Am J Ophthalmol, 80 : 184, 1975.

19. Binkhorst CD : Iris-supported artificial pseudophakia. A new development in intraocular artificial lens surgery (iris clip lens). Trans Ophthalmol Soc UK, 79 : 469-584, 1959.

20. Binkhorst CD : Results of implantation intraocular lenses in unilateral aphakia. With special reference to the pupillary or iris clip lens. A new method of fixation. Am J Ophthalmol, 49 : 703-710, 1960.

21. Binkhorst CD : Use of pupillary lenses (iris clip lens) in aphakia. Br J Ophthalmol, 46 : 343-356, 1962.

22. Binkhorst CD : Iris-clip and iridocapsular lens implants (Pseudophakia). Personal techniques of pseudophakia. Br J Ophthalmol, 51 : 767-771, 1967.

23. Binkhorst CD, Nygaard P, Loones LD : Specular Microscopy of the corneal endothelium and lens implant surgery. Am J Ophthalmol, 85 : 597-605, 1978.

24. Bidya Vilas : All India Ophthalmol Soc J, 1988.

25. Billore OP, Khurram MA et al : Competetive study of intraocular lens implant. All India Ophthalmol Soc J, 1986.

26. Burke JP, Willshaw HE, Young JDH : Intraocular lens implants for uniocular cataract in childhood, 73 : 860-64, 1989.

27. Cheng DP, Sturrock GD, Ruhinstoin B, Bulipitt CJ : Endothelial cell loss and corneal thickness after intraocular extraction and iris clip lens implantation. Br J Ophthalmol, 61 : 785-90, 1977.

28. Choyce DP : Complications of the AC implants of the early 1950s and the UGH or Ellingson syndrome of the late 1970s. Am Intraocular implant Soc J, 4 : 22,1978.

29. Colerio JA : Combined intracapsular cataract extraction and trabeculectomy with severin five loop posterior chamber intraocular lens. Br J Ophthalmol, 70 : 638-641, 1986.

30. Crawford JB : A histopathological position of the shearing intraocular lenses in the posterior chamber. Am J Ophthalmol, 91 : 458-61, 1981.

31. David J Apple, Nick Mamlis : Complications of intra-ocular lenses. A historical and histopathological review. Surv Ophthalmol, 29 : 23, 1984.

32. David ben Ezra, Jaun H, Paez : Congenital cataract and intraocular lenses. Am J Ophthalmol,96 : 311-14, 1983.

33. Davidson : Recent advances in ophthalmology, 1986.

34. Drews RC : Intermittent touch syndrome. Arch Ophthalmol, 100 : 1440-41, 1982.

35. Drew RC : A practical approach to lens implant power. Am Intraocular Implant Soc J, 3 (3-4) : 170-76, 1977a.

36. Drew RC : The Barraquer Experience with intraocular lenses. Ophthalmology, 89 : 386-93, 1982.

37. Duffiner LR, Wallace WK, Stiles WR : The Miami co-operative community study on the Copeland intraocular lens (pseudophakos). Am J Ophthalmol, 82:590-93,1976.

38. Dupont Guerry and Walter J, Ceeraets : Complications of anterior chamber lenses. Am J Ophthalmol, 54 : 229-32, 1962.

39. Ellingson FT : Complication with the Choyce mark VII anterior chamber lenses implant (uveitis glaucoma and hypheema). Am Intraocular Implant Soc J, 3 : 199-205, 1977.

40. Ellingson FT : The uveitis-glaucoma-hyphema syndrome associated with the mark VIII Anterior chamber lens implant. Am Intraocular Implant Soc J, 4 : 50-53,1978.

41. Epstein E : The Ridley lens implant. Br J Ophthalmol, 41 : 268-76, 1957.

42. Ezra Maguen, Anthony B Nesburn, Norman Jackman : Broken Semiflexible intraocular lens implant . Am J Ophthalmol, 99 : 170-72, 1985.

43. Fechner's : Intraocular lenses.

44. Fernandez S Tony : Proceedings of 47th Conference held at Madras. All Ind Ophthalmol Soc J, 1989.

45. Gass JDM, Norton EWD : Cystoid macular oedema and papilledema following cataract extraction. A flourescein fundoscopic and angiographic study. Arch Ophthalmol, 76 : 646-661, 1966.

46. George H, Bresnick : Eye containing anterior chamber acrylic implant. Arch Ophthalmol, 82 : 726-37, 1969.

47. Gerding DN, Poley B, Hall WH et al : Treatment of pseudomonas endophthalmitis associated with prosthetic intraocular lens implantation. Am J Ophthalmol, 88 : 902-908, 1979.

48. Gill JP, Loyd TL : Am J Implant Soc, 5 : 9, 1979.

49. Hagan JC III : A comparative study of z and other anterior chamber intraocular lenses. J Am Intracul Soc, 10324-328, 1984.

50. Haworth SM : After 426 Fyodorov lens implantations. Trans Ophthalmol Soc UK, 102 : 498-500, 1982.

51. Hirst LW, Snip RC, Stark WJ, Maumenee AE : Quantitative corneal endothelial evaluation in intraocular lens implantation and cataract surgery. Am J Ophthalmol, 84 : 775-80, 1977.

52. Jardine P, Sandford Smith JH : Fyoderov iris supported intraocular acrylic lens. Br J Ophthalmol, 58 : 718-24, 1974.

53. Jaffe NS, Eichenbaum DM, Clayman HM et al : Dislocation of Binkhorst four loop lens implant. Ophthalmology, 86 : 207-11, 1979.

54. Jungschaffer DH : Iris clip lens and retinal detachment. Examination and surgery of three eyes. Arch Ophthalmol, 88 : 594-95, 1972.

55. Jwatts : Retrospective comparison of lens implant.

56. Kadam Subhash P : All India Ophthalmol J, 1987.

57. Klein RM, Datzin HM, Yannyzzi LA : The effect of indomethacin pretreatment of aphakic cystoid macular oedema. Am J Ophthalmol, 87 : 847-49, 1979.

58. Liesegang TJ et al : Short and long term endothelial cell loss associated with cataract extraction and intraocular lens implantation. Am J Ophthalmol, 97 : 32-39,1984.

59. Makley TA Jr, Keates RH : Detachment of Descement's membrane with insertion of IOL implants. Ophthalmic Surg, 11 : 492-494, 1980.

60. Mamoru M et al : Comparative study of the effect of intraocular irrigating solution on corneal endothelium in intraocular lens implantation, 1991

61. Manson N : A Dedicated intercapsular intraocular lens Em J Implant Ref Surg, 1 : March, 1989.

62. Mehta KR : Phako-emulcification cataract extraction with foldable IOLs first 50 cases. Ind J Ophthalmol, 37 : 80-83, April-June, 1989.

63. Meisler DM et al : Chronic propionibacterium endophthalmitis after extracapsular cataract extraction and intraocular lens implantation. Am J Ophthalmol, 102 : 733-739, Dec, 1986.

64. Meur G : Small incision Disc lens. Em J implant Ref Surg, vol 1, March, 1989.

65. Miami Study Group : The cystoid macular edema in aphakic and pseudophakic eye. Am J Ophthalmol, 88 : 45-48, 1979.

66. Moore JG : Intraocular implants - the post operative astigmatism. Br J Ophthalmol, 64 : 318-21, 1980.

67. Mosien MA, Lusk B, Pettit TH et al : Fungal endophthalmitis following intraocular lens implantation. Am J Ophthalmol, 83 : 1-8, 1977.

68. Neuman R, Zalish Mand Oliver M : Effect of intraocular lens implantation on combined extracapsular cataract extraction with trabeculectomy : a comparative study. Br J Ophthalmol, 72 : 741-745, 1988.

69. Obstbaum SA, Galin MA : Cystoid macular edema and ocular inflammation. The corneo-retinal inflammatory syndrome. Trans Ophthalmol Soc UK, 99 : 187-91, 1979.

70. Olson RJ : The position of intraocular lens. Arch Ophthalmol, 97 : 715-16, 1979.

71. Paranjpe YM et al : Intraocular lens implant in Indian Eye. Ind J Ophthalmol, 31 : 853 Sept, 1983.

72. Pearce JL : Long term results of the Binkhorst iris clip lens in senile cataract. Br J Ophthalmol, 56 : 319-31, 1972.

73. Pearce JL : Sixteen months experience with 140 posterior chamber intraoculer lens implants. Br J Ophthalmol, 61 : 310-315, 1977.

74. Pearce JL : Current state of posterior chamber intraocular lenses after intracapsular and extracapsular cataract surgery. Trans Ophthalmol Soc U.K., 101 : 73-76, 1981.

75. Percival SPP, Yousef KM : Treatment of uniocular aphakia. Br J Ophthalmol, 60 : 642-44, 1976.

76. Percival P; Early experience with diffractive Bifocal lens. Em J Implant Ref Surg, vol 1,March, 1989.

77. Pettit TH, Olson RJ, Foos RY, Martin WJ : Fungal Ophthalmitis in following intraocular lens implantation. A surgical epidemic. Arch Ophthalmol, 98 : 1025-39, 1980.

78. Richardson KT : Arch Ophthalmol, 89 : 78, 1973.

79. Ridley H : Intraocular acrylic lenses. Br J Ophthalmol, 36 : 113, 1952a.

80. Rooper Hall : Cataract extraction and intraocular lens. Recent advances in Ophthalmology by Davidson, 1985.

81. Sebestyen JG : Intraocular lenses and diabetes Mellitus. Am J Ophthalmol, 101 : 425-428, April, 1986.

82. Severin SL : Late cystoid macular edema in pseudophakia. Am J Ophthalmol, 90 : 223-25, 1980.

83. Simmons ST et al : Extracapsular cataract extraction and posterior chamber intraocular lens implantation combined with trabeculectomy in patients with glaucoma. Am J Ophthalmol, 104 : 465-470, Nov 1987.

84. Singh DJ : Cystoid macular edema. Ind J Ophthalmol, 31 : 140, May 1982.

85. Smith EW ; Drance SM : Arch Ophthalmology, 68 : 734, 1962.

86. Stark WJ, Rosenblum P, Maumenee AE et al : Post-operative inflammatory reactions to intraocular lenses sterilized with ethylene-oxide. Ophthalmology, 87 : 385-89, 1980.

87. Strampelli B : Anterior chamber lenses. Arch Ophthalmol, 66 : 12-17, 1961.

88. Stark WJ, Hirst LW, Snip RC, Maumenee AE : A two year trial of intraocular lenses at the wilmer institute. Am J Ophthalmol, 84 : 769-73, 1983.

89. S. Tony Fernandez and Sebastin Pious, Angomally : A long term follow up of anterior chamber lens ICL. All India Ophthalmological Society, 47th Annual Conferance, 1989.

90. S. Tony Fernandez and EJ Mani, Angomally : Intraocular lens implantation in capsular bag. All India Ophthalmol, Soc, 1987.

91. Subhash P Kadam Baroda : Problems of anterior and posterior chamber implant. Surg in India condition. All India Ophthalmol Soc, 1987.

92. Sudhakar J, Ravindran RD and Nathichiar G : Analysis of complications in 1,000 cases of posterior chamber intraocular lens implantation. Indian J Ophthalmol, April-May-June, 1989.

93. Sutton GA : Intraocular lens implantation by surgeons in training. Br J Ophthalmol, 64 : 687-88, 1980.

94. Watts J : Retrospective comparison of lens implant surgery and cataract surgery in a provincial unit. Br J Ophthalmol, 70 : 415-417, 1986.

95. Wintex FC : Arch Ophthalmol, 75 : 725, 1977.

96. Van Buskirk EM : Pupillary block after intraocular lens implantation. Am J Ophthalmol, 95 : 55-59,1983.

97. Vastine DW, Weinberg, Sugar J Binder PS : Stripping Descement's membrane associated with intraocular lens implantation. Arch Ophthalmol, 101 : 1042-45, 1983.

98. Yannuzzi LA, Klein RM, Wallyn RH et al : Ineffectiveness of indomethacin in the treatment of chronic cystoid macular edema. Am J Ophthalmol, 84 : 517-19, 1977.

99. Zaidman GW, Mondino BJ : Postoperative pseudophakic bacterial endophthalmitis. Am J Ophthalmol, 93 : 218-223, 1982.

100. Zimmerman TJ, Kaufman HE. Arch Ophthalmol, 95 : 601-7, 1977.

101. Zaidman GW, Mondino BJ : Postoperative pseudophakic bacterial endophthalmitis. Am J Ophthalmol, 93 : 218-23, 1982.

APPENDIX

PROFORMA FOR EXAMINATION

Case No.

1. Name of Investigator
2. Surgeon I/c
3. Place

Date :

Details of patient

1. Name .....
2. Age/Sex.....Wd/Bed....
3. Address .....
   .....
4. Occupation .....
5. Socio-Economic Status .....
6. In habit of taking any intoxicant .....

A. PRESENTING SYMPTOMS :

1.
2.
3.

B. A BRIEF HISTORY OF PRESENT ILLNESS :

Past History

H/o Diabetes

Hypertension

Any other

Family History

Examinations :

General Examination

CVS

Respiratory System

CNS

Abdomen

Local Examination

		Rt	Lt
1.	Facial Symmetry		
2.	Eye Brows		
3.	Eye lashes		
4.	Eye lids		
5.	Conjunctiva - Bulbar		
	- Limbal		
	- Palpabral		
	- Intermarginal strip		
6.	Cornea - Size		
	- Shape		
	- Surface		
	- Curvature		
	- Lustre		
	- Transparency		
	- Sensitivity		
7.	Anterior Chamber		
	(i) Depth - Normal/Shallow/Deep		
	(ii) Contents - Colour		
	- Nature		
	- Flare, if any		
8.	Iris - Colour		
	- Surface		
	- Pattern		
	- Atrophy, if any		

9. Pupil - Size
   - Shape
   - Colour
   - Reaction to light
   - Direct
   - Consensual

10. Lens - Position
    - Transparency
    - Any other finding

11. Visual acuity — Rt — Lt

12. Digital tension

13. Tonometry Shiotz :
    Applanation :

14. Fundoscopy :

15. Gonioscopy :

16. Perimetry :

17. S/L Examination :

18. Diagnosis :

Investigation :

(i) Urine examination
(ii) Blood routine examination
(iii) Blood sugar

Operative History

1. Date of operation :
2. Type of anaesthesia :
3. Type of surgery :
4. Use of visilon :
5. Type of lens implantation :
   Power of lens :

6. Complications :
   (1) Type
   (2) Rupture of lens
   (3) Vitreous Prolapse/loss
   (4) Hyphema
   (5) Iris injury
   (6) Any other

Post operative follow up Rt/Lt Eye

1. Date of exam/period
2. Conjunctiva
3. Condition of wound
4. Cornea
5. A/C
6. Position of lens
7. Iris Pupil
8. Other

.....